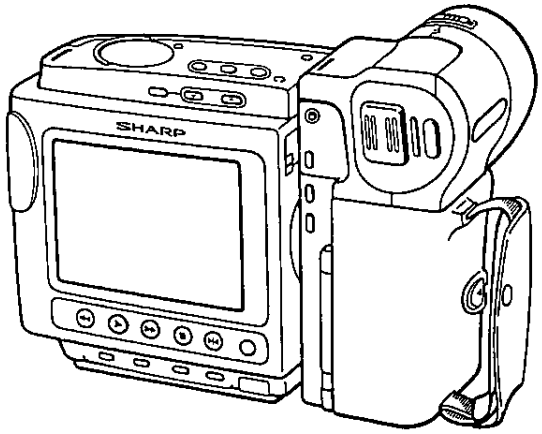
SHARP SERVICE MANUAL

S83E8VL-H400S



LIQUID CRYSTAL CAMCORDER Hi8 PAL

MODELS VL-H400S/H/X VL-H9E

In the interests of user-safety (Required by safety regulations in some countries) the set should be restored to its original condition and only parts identical to those specified be used.

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SHARP CORPORATION

1. FEATURES

- Hi8 RECORDING/PLAYBACK SYSTEM
- FREE-ANGLE SHOOTING AND INSTANT REPLAY WITH 4" COLOUR MONITOR
- DIGITAL ELECTRONIC IMAGE STABILIZATION
- DIGITAL STILL/STROBE/SNAP RECORDING
- Hi-Fi STEREO
- NEURO AUTO EXPOSURE
- DIGITAL AUTO WHITE BALANCE
- DIGITAL FULL RANGE AUTO FOCUS
- INFRARED REMOTE CONTROL
- 8 × POWER ZOOM
- 16:9 WIDE SCREEN
- 1/10000, 1/4000, 1/1000, 1/250, 1/120, AND STANDARD 1/50, SECOND SWITCHABLE HIGH-SPEED ELECTRONIC SHUTTER FOR BLUR-FREE STILL IMAGES
- FADE IN/OUT
- FLYING ERASE HEAD FOR EDITING
- EDIT SEARCH
- WARNING INDICATORS – LOW BATTERY, LOW LIGHT, TAPE END, ETC.
- 3-WAY POWER SOURCE: AC, RECHARGEABLE BATTERY AND CAR BATTERY (with optional VR-P100CH)
- S-VIDEO SOCKET

2. SPECIFICATIONS

Signal System	PAL type colour signals.
Recording System	4 rotary heads, helical scanning FM system
Cassette	8 mm video tape, MP type, or Hi8 MP, ME type
Tape Speed (SP)	Approx. 20.051 mm/second
Recording Time Max (SP)	90 minutes (P5-90)
Video Output Level	1 Vp-p, 75 ohms unbalanced, negative sync.; S-video terminal;
Audio Output Level	Y signal 1.0 Vp-p, C signal 300 mVp-p (burst signal),
Microphone input	75-ohm unbalanced
Pickup Device	48 dB (with Rohde & Schwarz noise meter)
Microphone input	−8 dBs, impedance less than 2.2 kohms Electret condenser microphone, stereo type
Pickup	1/3" CCD image sensor (approx. 470,000 pixels, including optical black)
Minimum required illumination	6 Lux*
Lens	F2.0, f=5.8–46.4 mm, 8× power zoom, full-range auto focus with macro function
Filter diameter	37 mm
Monitor	4" full-colour LCD screen (TFT active matrix)
Power source	DC 6 V
Power consumption	8.8 W during camera recording in Full Auto mode with Zoom motor off, backlight in normal mode, and DIS function off)
Colour temperature compensation	Auto white balance with white balance lock
Operating temperature	0°C to +40°C
Operating humidity	30% to 80%
Storage temperature	−20°C to +60°C
Dimensions (approx.)	201 × 155 × 91 mm (W/H/D)
Weight (approx.)	995 g (without battery pack, lithium battery, and video cassette)

AC power adaptor/Battery charger specifications

Power requirement:	110–240 V, 50/60 Hz
DC output:	6.0 V
Power Consumption:	23 W
Dimensions (approx.):	70 x 44.3 x 165 mm (W/H/D)
Weight (approx.):	350 g

SUPPLIED ACCESSORIES

Standard battery pack (BT-BH70)	Shoulder strap	Audio/Video cable
AC power adaptor/battery charger	DC output cable	S-video cable
Infrared remote control unit	Lithium battery × 2	Cleaning cloth

OPTIONAL ACCESSORIES

Standard battery pack (BT-77, BT-BH70)
Car battery adaptor/charger (VR-P100CH)
Tuner pack (VR-HT10P)
Shoe adaptor (VR-30AD)
Wide conversion lens (VR-WC37P)
Sun hood (VR-400BF)
Soft cover (VR-400PC)
Sports housing (VR-400SP)
Weather resistant housing (VR-400SJ)
RF converter (VR-S30RF)
Battery pack for extended use (BT-80-BK, BT-BH85)
A/V output cable (VR-C21S) (21-pin Euro-SCART)
Video light (VR-30VL)
Tele-conversion lens (VR-TC37P)
Tripod adaptor for 180° recording (VR-FA100P)
Soft case (VR-30SC)
Thick shoulder strap (VR-400WS)
Waterproof housing (VR-400MP)
Cleaning kit (VR-30CK)

Design and specifications are subject to change without notice.

*Minimum illumination: Since there is no widely accepted testing procedure for determining minimum illumination capability, lux ratings are comparable only between models from the same manufacturer.

3. Handling of Ni-Cd battery

Please be noted that two types of battery are used in our CAMCORDER, and each of them should be handled in a different manner respectively: One is Ni-Cd battery employed in this model (and the other is conventional Sealed Lead-Acid battery).

1. Storage
(1) The battery should be stored in normal room temperature and humidity. It will have a shorter life if it is placed and stored in high or low temperature.
(2) Ni-Cd battery should be stored in discharged condition.
(On the contrary, Sealed Lead-Acid battery should be stored in full-charged condition.)

2. Charging
(1) Battery charger must be a genuine one.
If a wrong charger is used, the electrodes (+ and −) will be damaged.
(2) This Ni-Cd battery should be charged just before use.
For a longer life, keep it in discharged condition and charge it just before use.
(As for Sealed Lead-Acid battery, charge should be done periodically.)
(3) Over charge should be avoided.
Over charging will affect the life of the battery. Attempting to charge a full-charged battery agein in a short period (say within half a day) may result in an overcharge, causing a shorter life of the battery.
(4) Charging in a hot place should be avoided.
As it will affect the life of the battery, charging should be done in a cool place.
If it is charged in a hot place, the battery may have abnormally high temperature, causing a shorter life of it.

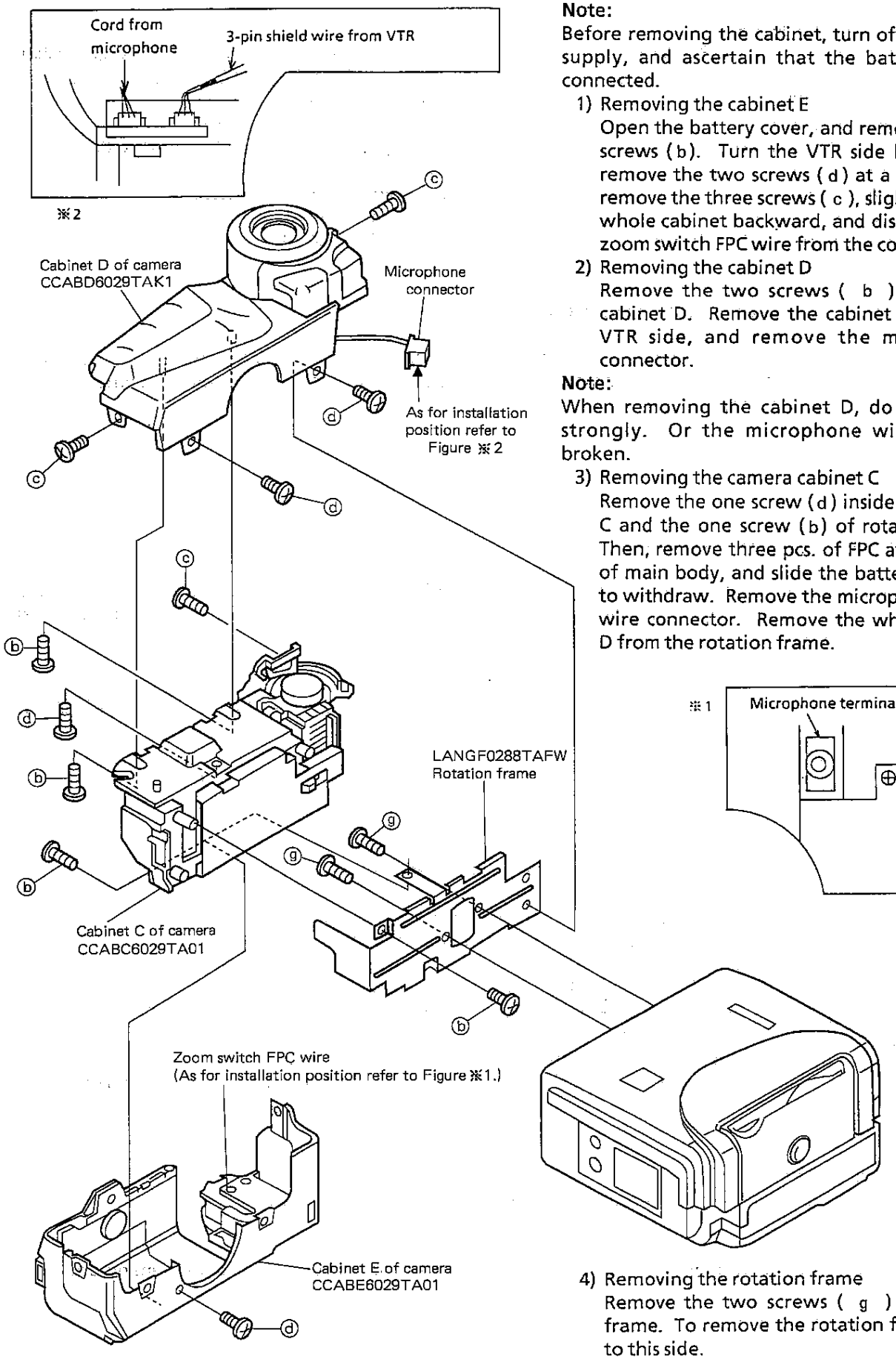
Protect your environment!
Batteries must not be thrown into household waste; they need a special treatment.

Der Umwelt zuliebe!
Batterien dürfen nicht mit den Siedlungsabfällen entsorgt werden, sondern verlangen Sonderbehandlung.

Pensez à votre environement!
Ne pas jeter les piles avec les ordures ménagères, exige un traitement spécial.

5. DISASSEMBLY

5-1. DISASSEMBLING THE CABINET


Cord from microphone
3-pin shield wire from VTR
※2
Cabinet D of camera CCABD6029TAK1
Microphone connector
As for installation position refer to Figure ※2
LANGF0288TAFW Rotation frame
Cabinet C of camera CCABC6029TA01
Zoom switch FPC wire (As for installation position refer to Figure ※1.)
Cabinet E of camera CCABE6029TA01

5-1-1. REMOVING THE CASING

● REMOVING THE CAMERA SECTION

Note:

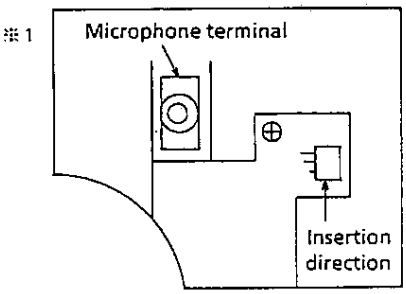
Before removing the cabinet, turn off the power supply, and ascertain that the battery is not connected.

1) Removing the cabinet E
   Open the battery cover, and remove the two screws (b). Turn the VTR side by 90°, and remove the two screws (d) at a side. Then, remove the three screws (c), slightly pull the whole cabinet backward, and disconnect the zoom switch FPC wire from the connector.
2) Removing the cabinet D
   Remove the two screws (b) inside the cabinet D. Remove the cabinet D from the VTR side, and remove the microphone connector.

Note:

When removing the cabinet D, do not pull it strongly. Or the microphone wire may be broken.

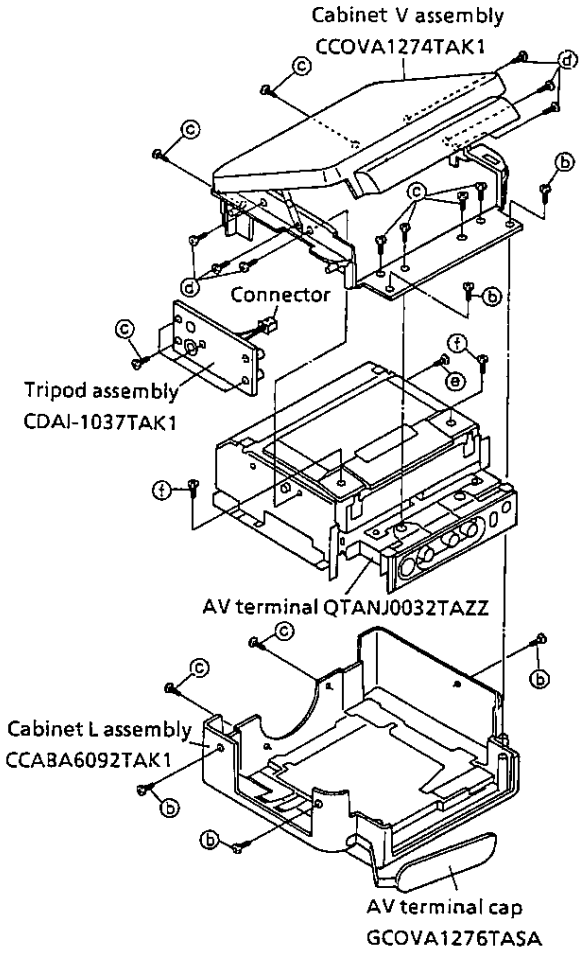
3) Removing the camera cabinet C
   Remove the one screw (d) inside the cabinet C and the one screw (b) of rotation frame. Then, remove three pcs. of FPC at lower side of main body, and slide the battery terminal to withdraw. Remove the microphone shield wire connector. Remove the whole cabinet D from the rotation frame.



4) Removing the rotation frame
   Remove the two screws (g) of rotation frame. To remove the rotation frame, pull it to this side.

• REMOVING THE VTR SECTION

1) Removing the VTR cover assembly
   Remove the six screws "d" fixing the VTR cover assembly, and then remove the 5 screws "b" fixing the cabinet A assembly and VTR cover assembly. Remove the 6 screws fixing the VTR cover assembly. After that, withdraw upward the VTR cover assembly.
2) Removing the tripod assembly
   Remove the four screws "c" fixing the tripod withdraw upward the tripod assembly, and remove the connector.
3) Removing the cabinet A assembly
   Remove the two connectors provided near the tripod. Then, remove the screw "e" fixing the inverter transformer unit. After that, remove the two screws fixing the cabinet L assembly. Remove the AV terminal cap fitted to the AV terminal, and withdraw upward the VTR mechanism unit.
   Remove the FPC of inverter unit from the connector.
   Note:
   Be careful when removing of the VTR mecha unit since too much force may cause the FPC wire breaking of the inverter unit



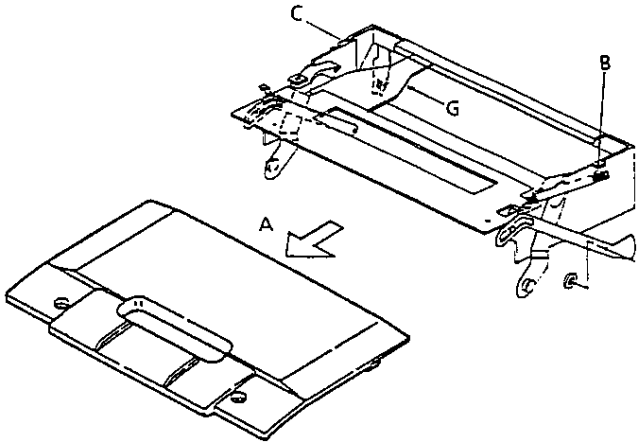
• REMOVING THE HL400U CASSETTE COMPARTMENT

1) Eject the cassette compartment.
   Mount the power supply unit (battery or AC adapter with DC cable) without removing the cabinet A, open the VTR of cabinet, and press the EJECT button to eject the cassette compartment.

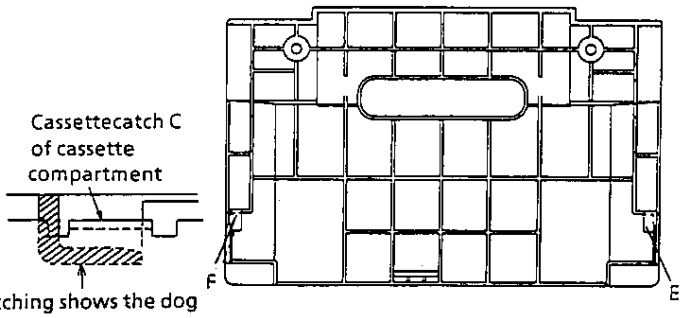
Note:
When mounting or removing the cassette compartment cover, be sure to eject the cassette compartment in advance.

2) Remove the two screws fixing the cassette compartment cover, and slide the cassette compartment cover in the direction A to remove it from the cassette compartment.

Note:
When mounting the cassette compartment cover, ascertain that the cassette compartment cover catches B and C of cassette compartment shown above are engaged with the dogs of cassette compartment cover as shown in View G.



Cassette compartment cover

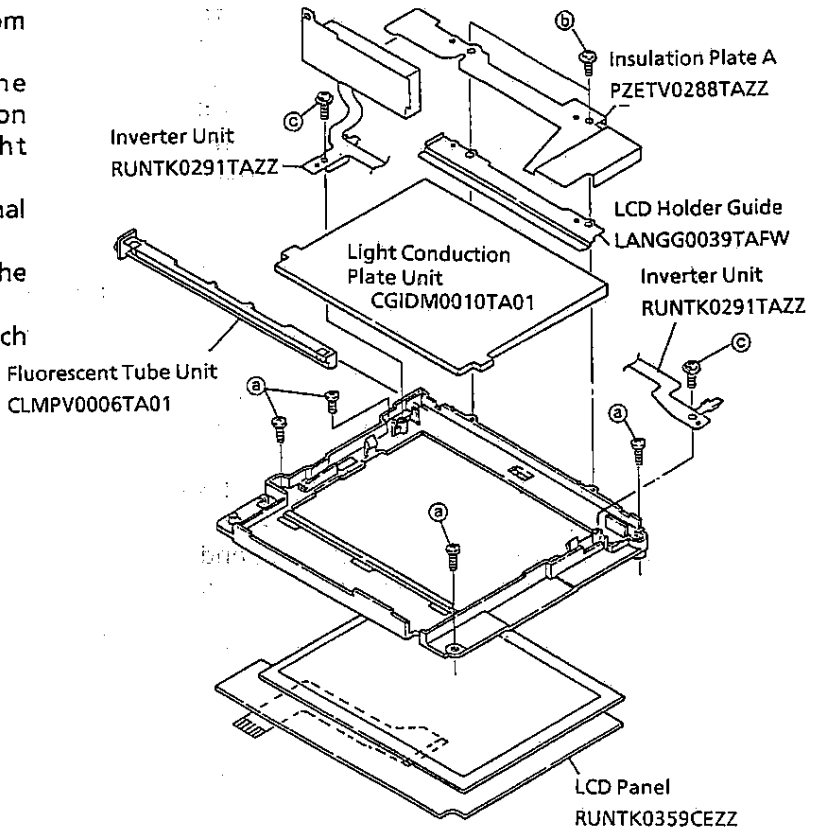


The hatching shows the dog of cassette compartment cover.
View G

Rear view of cassette compartment cover

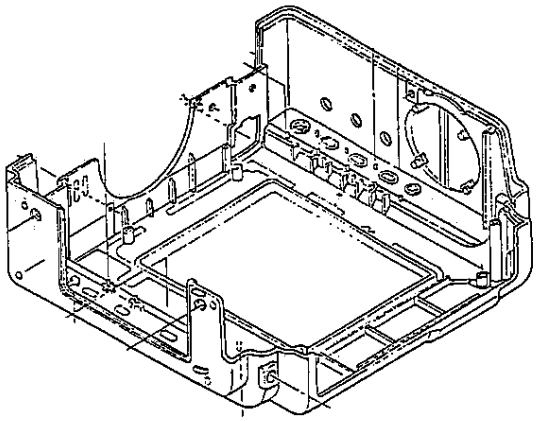
• REMOVING THE LCD UNIT

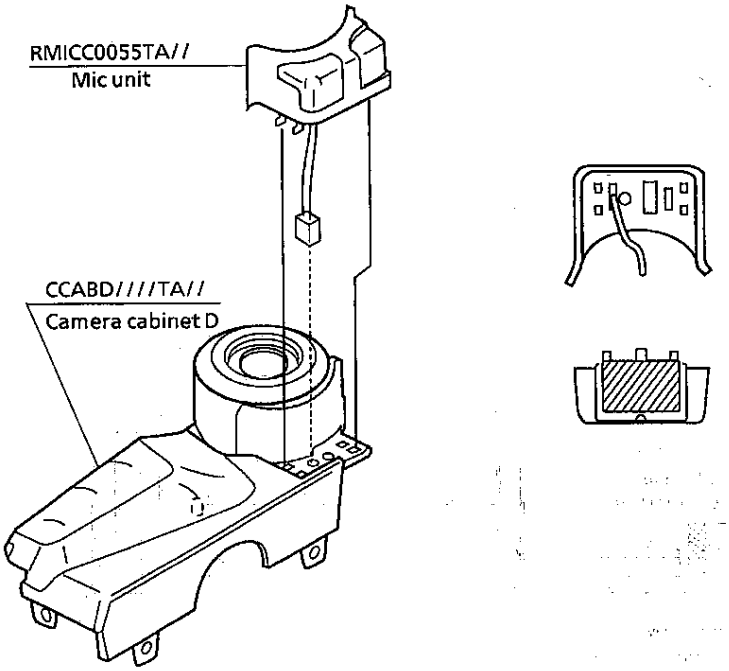
1) Unscrew four screws (a) fixing the LCD holder assembly to detach the unit from the cabinet.
2) Unscrew two screws (b) fixing the insulation plate to remove the insulation plate, LCD holder guide and light conduction plate unit.
3) Unscrew two screws (c) fixing the terminal of the inverter unit to detach the unit.
4) Pull off the fluorescent tube unit from the L holder.
5) Release the clicks of the L holder to detach the LCD panel.



• CAUTION FOR MIC REMOVAL

Be cautious enough not to damage the mic when it is removed since the sticky double-faced tape is used in the oblique part as shown in the figure below.





6. TROUBLESHOOTING

6-1. POWER CIRCUIT TROUBLESHOOTING

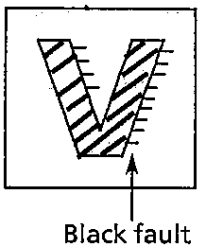
No.	Trouble	Possible cause
1	Power cannot be supplied.	1) There is no voltage on TL953 or voltage is too low. → Check the fuse F901, battery, and AC adapter. 2) Voltage is not applied to the IC900 (20), (21), and (22) pins, or voltage is too low. → Check the system control circuit. 3) Check waveform on the IC900(17) pin and IC901(2) pin with oscilloscope. Triangular wave of about 600 mVp-p, 480 kHz is not found. → Check the periphery of IC900(14), (15), (16), and (17) pins. 4) Connect the oscilloscope to TL732, and check that voltage of about 4.9V is obtained soon after the power supply is turned on. If voltage of about 4.9V is obtained, proceed to the step of item 6). If voltage of about 4.9V is not obtained, proceed to the step of item 5). 5) Check for short-circuiting between TL732 and TL954 with the aid of tester. If short-circuit is found: → Load short-circuit of P-CON 4.9V line and PB4.9V line If short-circuit is not found: → Proceed to "P-CON4.9V check" of No.2. 6) Connect the oscilloscope to TL748(16.5V), TL3466(-8V), TL3467(13V), and TL742 (-16V), and check that 16.5V, -8V, 13V, and -16V is obtained soon after power supply is turned on. If each specified voltage is obtained: → Check the system control circuit. If each specified voltage is not obtained: → Proceed to the step of item 7). 7) Check for short-circuiting between TL954 and TL748, TL742, TL3466, TL3467, and TL742, respectively, with the aid of tester. If short-circuit is found: → Load short-circuit of specific line If short-circuit is not found: → Proceed to "16.5V, 13V, -8V, -16V check" of No.3.
2	P-CON 4.9V check	1) Check whether about 6V is applied to the Q903 emitter. If about 6V is applied: → Proceed to the step of item 2). If about 6V is not applied: → Check L900. 2) Using the oscilloscope, check that the Q903 base is set to L level (lower than emitter voltage by more than 0.6V) soon after power supply is turned on . If L level is set: → Proceed to the step of item 3). If L level is not obtained: → Check the IC900(4), (5), (6), (7), (8), (47), (48), and (1) pins and peripheral circuit. 3) Using the oscilloscope, check that the Q903 collector is set to H level (about 6V) soon after power supply is turned on. If H level is set: → Check L901, L902, L903, L904, L905, and check periphery of R934 and R935. If H level is not obtained: → Check Q903.

No.	Trouble	Possible cause
3	Check 16.5V, 13V, -8V, -21V and -12V.	1) Check that about 6V is applied to the Q908 emitter. If about 6V is applied: → Proceed to the step of item 2). If about 6V is not applied: → Check L906, F902. 2) Using the oscilloscope, check that pulse appears soon after power to the Q908 base is turned on. If pulse appears: → Proceed to the step of item 3) If pulse does not appear: → Check the IC901 (1), (2), (3), (4), (5), (6), (7), and (8) pins and peripheral circuit. 3) Using the oscilloscope, check that pulse (about 12 Vp-p) appears soon after power to the Q903 collector is turned on. If pulse appears: → Check D901, D902, L907, L908, L909, and L910. If pulse does not appears (or level is too low): → Check Q908, Q917, T900.
4	LCD output failure	1) Check whether 12.6V is found on TL3467. If 12.6V is found: → Check the LCD circuit. If 12.6V is not found: → Check Q909 and peripheral circuit.Check for 13V line short-circuiting.
5	Camera EE output failure	1) Check whether about 4.45V is found on TL741. If about 3.3V is found: → Proceed to the step of item 4). If about 3.3V is not found: → Proceed to the step of item 2). 2) Check whether about 6V is applied to the Q915 emitter. If about 6V is applied: → Proceed to the step of item 3). If about 6V is not applied: → Check L914. 3) Using the oscilloscope, check that the Q903 base is set to "L" level (lower than emitter voltage by more than 0.6V) approx. 200 msec after power is turned on. If L level is set: → Check L912 and L913. Check periphery of L950 and R951. If L level is not set: → Check IC900 (2), (3), (9), (10), (11), (12), (13), (43), and (44) pins and peripheral circuit. 4) Check whether about 4.9V is found on the TL740 pin. If about 4.9V is found: → Proceed to the step of item 3). If about 4.9V is not found: → Proceed to the step of item 2). 5) Check whether the Q907 base is set to "L" level. If "L" level is set: → Check Q907, L912 and L913.Check for short-circuiting of CAM 4.9V line. If "L" level is not set: → Check Q912 and system control circuit. 6) Check whether TL748 is set to 16.5V and TL742 is set to -16V. If specified voltages are found: → Check the camera circuit and Y/C circuit. If specified voltages are not found: → Check Q912, Q913, Q914, peripheral circuit, and system control circuit.

6-2. Y/C SYSTEM TROUBLESHOOTING

(Y SIGNAL SYSTEM)

No.	Trouble	Possible cause
1	No screen indication 1. EE mode (VTR terminal, S terminal)	1) Check that the input/output selection is set to OUTPUT. (MENU screen) 2) Check that the control signal from the MECHACON controller is sent to the IC401(47) to (49) pins. If not, check the MECHANICAL control circuit. 3) Ascertain that the CAM Y signal is output to the IC1401(25) and (17) pins. 4) Check the CAM Y signal [or Y + C signal for (36)] in order of IC401(30) pin - (34) pin - (32) pin - (36) pin. 5) Check that the CAM-Y signal is output to TP1403 and the camera C signal is output to TP1404. 6) Check that the CAM Y + C signal is output to TP1402 and TP1401.
	2. Standard tape (Hi-8 tape) playback mode	1) Check EE screen. 2) Check that the playback FM signal is sent to the connector P35 (4) pin.(Approx. 300 mVp-p) If not, check the head amplifier circuit and RF circuit Q3402 to Q3405. 3) Check the playback FM signal on IC3402(42) pin.(Approx. 100 mVp-p) 4) Check the playback FM signal on the IC3402(46) pin. (Approx. 450 mVp-p) 5) Check the playback FM signal on the IC3402(11) pin. (Approx. 450 mVp-p) 6) Check the playback FM signal on the IC401(41) pin. (Approx. 450 mVp-p) 7) Check the FM demodulation Y signal on the IC401(7) pin.(150 mVp-p between sync chip and white 100%) 8) Check the playback Y signal in order of TP402 - TP403 - IC401(34) pin.(Signal level of about 0.5 Vp-p)
	3. Standard tape (normal tape) playback mode	1) The same as stated in item 2. 1), 2) "Standard tape (Hi-8 tape) playback mode 2) Check the playback FM signal on the IC3402(41) pin. (Approx. 500 mVp-p) 3) Check the playback FM signal on the IC3401(45) pin. (Approx. 500 mVp-p) 4) Check the playback FM signal on the IC3402(14) pin.(Approx. 150 mVp-p) 5) Check the playback FM signal on the IC3402 (16) pin.(Approx. 200 mVp-p) 6) Check the playback FM signal on the IC401(41) pin.(Approx. 200 mVp-p)

No.	Trouble	Possible cause
1	4. Self-record/ playback mode (recording is impossible)	1) Check in the EE and standard tape playback modes. 2) In the CAM record mode check the CAM Y signal in order of TP402 - TP403.(Approx. 0.5 Vp-p) 3) Check the REC FM signal on TP404. 4) Check the REC FM signal of R322 of head amplifier circuit and the REC MIX (REC-C + REC-AFM + REC-AFT) signal of R323. (Voltage waveform is not seen since current input is applied to the (7) pin of IC301.) 5) Check the record current on the connector P35(1) pin of head amplifier circuit.(Approx. 300 mVp-p) 6) When Hi-8/normal control signal is set to Hi-8, ascertain that High is input to the (25) pin of IC3402 from the IC1701.
2	Display fault in self-record/playback mode  Black fault	1) Ascertain adjustment (recording system). (Especially, carrier deviation, Y/C recording current) 2) Check the PB Y FM signal level of (4) pin of (playback system) connector P35. (Approx. 300 mVp-p) If the level is not found, check the head amplifier circuit and RF circuit Q3402 to Q3405. 3) In the Hi-8 mode check the playback FM signal level of IC3402 (42) and (11) pins.(Approx. 100, 450 m Vp-p). Check especially pins (2), (3), (8), (44), and (46) also check the external part of pins (11) and(13). (Crack, breakage, etc.) 4) Check the playback FM signal level of the IC401(7) pin.
3	Self-record/playback noise	1) The same as stated in items 2-1), 2), 3), and 4). 2) Use the cleaning tape to clean the clogged head.
4	Periodic appearance of noise on playback screen	1) Check the AFT error signal of IC1701 (60) pin in the playback mode. 2) Check that the REC ATF signal is sent to R323 of head amplifier circuit in the record mode.
5	Recorded character is not displayed.	1) Check that the LCD circuit is operating normally. (Especially, HD output of IC801 (12) pin and VD output of (15) pin) 2) Check that the VD and HD signals are sent to the IC704 (19) and (20) pins. 3) Check that the recorded character signal is output to the IC704(14) and (15) pins and IC1401(16) and (18) pins.

(Color signal system)

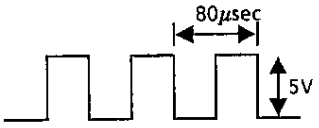
No.	Trouble	Possible cause
1	No color indication 1. Camera EE mode	1) Does the chroma signal appear at IC1401pins (29) and (15)? → Check pin (24) H and pin (16) L. 2) Does the chroma signal appear at IC402 pins (7) and (1). → Check IC402 pins (7) and (1) external parts. Check IC402 pin (5) L. 3) Does the chroma signal appear at IC401pins (64) and (36)? At pin (36), Y + C → Check the voltage at Q445, IC401 pin (36)~(38) external parts. 4) Does the chroma signal appear at IC401pin (8). (Low pass conversion chroma)? → Check the voltage at pins (51), (52), (54), (57), (59) external parts.
	2. Standard tape playback mode	1) Check at the step 1) Camera EE mode. 2) Does the chroma signal appear at IC401 pin (45)? (YFM + C signal; $1V_{p-p}$) → Check Q446, Q2402 and Q2420. 3) Is the chroma signal at IC401 pin (23) normal? → Does the 4.43 MHz subcarrier appear at Q437 emitter, the H-SW-P at pin (46), and the CSYNC at pin (24)? 4) Does the chroma signal appear at IC401 pins (21) and (63)? → Check Q426, IC403, Q448, Q425, Q424 and Q423. 5) Does the chroma signal appear at IC402 pin (6)? → Check Q454, Q455, IC2401 pins (2) and (15), Q2403 and Q2409. 6) Does the chroma signal appear at IC401pin (64)? → Check IC402 pin (1) and Q445. Check that IC402 pin (5) is H.
	3. Self record/ playback mode	1) Camera EE mode 2) Standard tape playback 2) Check the REC chroma signal appears at IC401 pin (8). 3) Check the REC chroma signal appears at IC406 pin (3). 4) Check the REC chroma signal appears at Head amp Test 2 connector pin (1). → Check Q3406.

6-3. AUDIO CIRCUIT TROUBLESHOOTING

No.	Trouble	Possible cause
1	Audio signal is not recorded.	1) Check that the audio signal is input into the IC603(27) and (34) pins in the camera EE mode. 2) Check that A FADE and A-MUTE-H are set to "L" in the record mode. 3) Check that the FM signal (approx. 200 mVp-p) is sent to TP603. 4) Check "fo" adjustment.
2	Playback audio signal is not output.	1) Check that the envelope (approx. 10 mVp-p) is input into the IC603(79) pin and (63) pin, and check for loss. 2) Check that A-MUTE-H is set to "L". 3) Check that audio signal is output to TP616 and TP613.
3	Speaker audio signal is not output.	1) Check that headphone audio signal is output. Yes: Check that NON REG 6V is applied to the IC6403(2) pin while the headphone is disconnected from the headphone jack. Ascertain that HP $\overline{\text{ON}}$ and SP CTL are set to "H". No: Check that audio signal is output to TP616 and TP613. Check that VOL CTL voltage changes in the range of 0 to 4.9V when the volume button is pressed.
4	Stereo recording is impossible.	1) Check that the ST/$\overline{\text{MONO}}$ signal is set to "H". Yes: Check "fo" adjustment. No: Check that the MIC $\overline{\text{MONO}}$ signal is set to "H" in the camera mode. Check the JACK MONO signal is set to "L" during line input recording (when cable is connected to the L/R pin jack) in the VTR mode.
5	Audio signal is output from the speaker even when headphone is connected.	1) Check that the HP $\overline{\text{ON}}$ signal is set to "L" when the headphone is connected.

6-4. SYSTEM CONTROL SECTION TROUBLESHOOTING

Disposal of errors (if the same trouble occurs after power supply resetting, perform the following operation)

No.	Error indication	Corrective action
1	E007	• Set the SENSOR-OFF mode [set the servicing adjustment jig SW2 (sensor OFF) to ON], and perform FF or RW. 1) Check that the pulse as shown below is input into the IC1701(75) pin.  → If such a pulse is input, IC1701 is defective. 2) Check that the pulse shown above is output from the IC1705(12) pin. → If such a pulse is output, check soldering of IC1705(12) pin. 3) Check that sine wave of 50 mVp-p is input into the IC1705(9) and (10) pins with the same period as that of pulse shown above. a. If the sine wave is input, check soldering of all pins of IC1705, R1783 and C1790. b. If the sine wave is not input, check soldering of SC30 connectors (1) to (4).
2	E011	• Check that voltage is applied to both ends of loading motor when playback is started in halt state after the sensor-off mode is set. 1) If voltage is applied: a. Check whether there is undue mechanical engagement. b. Check for contact failure of connector P33. 2) If voltage is not applied: a. Check that the forward rotation and reverse rotation signals are sent to the IC1701 (21) and (22) pins. → If these signals are not sent, check soldering of SC26(1) pin and R724. b. Check that there is an output from the IC1704(18) and (3) pins. → If there is no output, check whether about 6V is supplied to the IC1704 (8) pin. → If there is an output, check soldering of Q1708 and R1773.
3	E012	1) Perform the same check as that stated in No.2 above.

No.	Error indication	Corrective action
4	E020	• Set the playback state in the sensor-off mode, and check that the drum is rotating. 1) If the drum is rotating: a. Check that the DRUM FG pulse of IC1701(67) pin is input. → If the pulse is input, IC1701 is defective. b. Check that the DRUM FG pulse is output from the IC1706(22) pin. → If the pulse is output, check soldering of IC1706(22) pin. c. Check that D FG (50 mVp-p sine wave) is input into the IC1706 (22) pin. → If input is found, IC1706 is defective. → If input is not found, check soldering of connector SC29(3) and (4) pins and IC1706 (16), (19) pins. 2) If the drum does not rotate: a. Check that DRUM VS (about 1.6V or more) is supplied to the IC1706(5) pin. → If it is supplied, check whether voltage on the IC1706(6) pin is about 6V DC. → If approx. 6V DC is not obtained, check soldering of Q702. → If approx. 6V DC is obtained, check soldering of all pins of IC1706. b. Check that DRUM ERR (about 1.3V DC) is supplied to the IC900(25) pin. → If DRUM ERR is supplied, check the power circuit. c. Check whether the DRUM D/A(2.5V DC bias) pulse is input into the IC1707(2) pin. → If the pulse is input, check soldering of IC1707(1) to (7), (24) to (29) pins, C1719 to C1727, R1784, R1794, R1739, R1749 and 1740. → If the pulse is not input, check soldering of R1719 and IC1701(72) pin.
5	E025	• Execute playback or FF in the sensor-off mode. 1) Check that the take-up reel pulse is input into the IC1701(57) pin. a. If the pulse is input, IC1701 is defective. b. If the pulse is not input, check soldering of IC1703(1), (2) and (3) pins, SC31(11) and (15) pins.
6	E026	• Rewind in the sensor-off mode. 1) Check that the feed reel pulse is input into the IC1701(58) pin. a. If the pulse is input, IC1701 is defective. b. If the pulse is not input, check soldering of IC1703(5), (6) and (7) pins and SC31(2) and (5) pins.

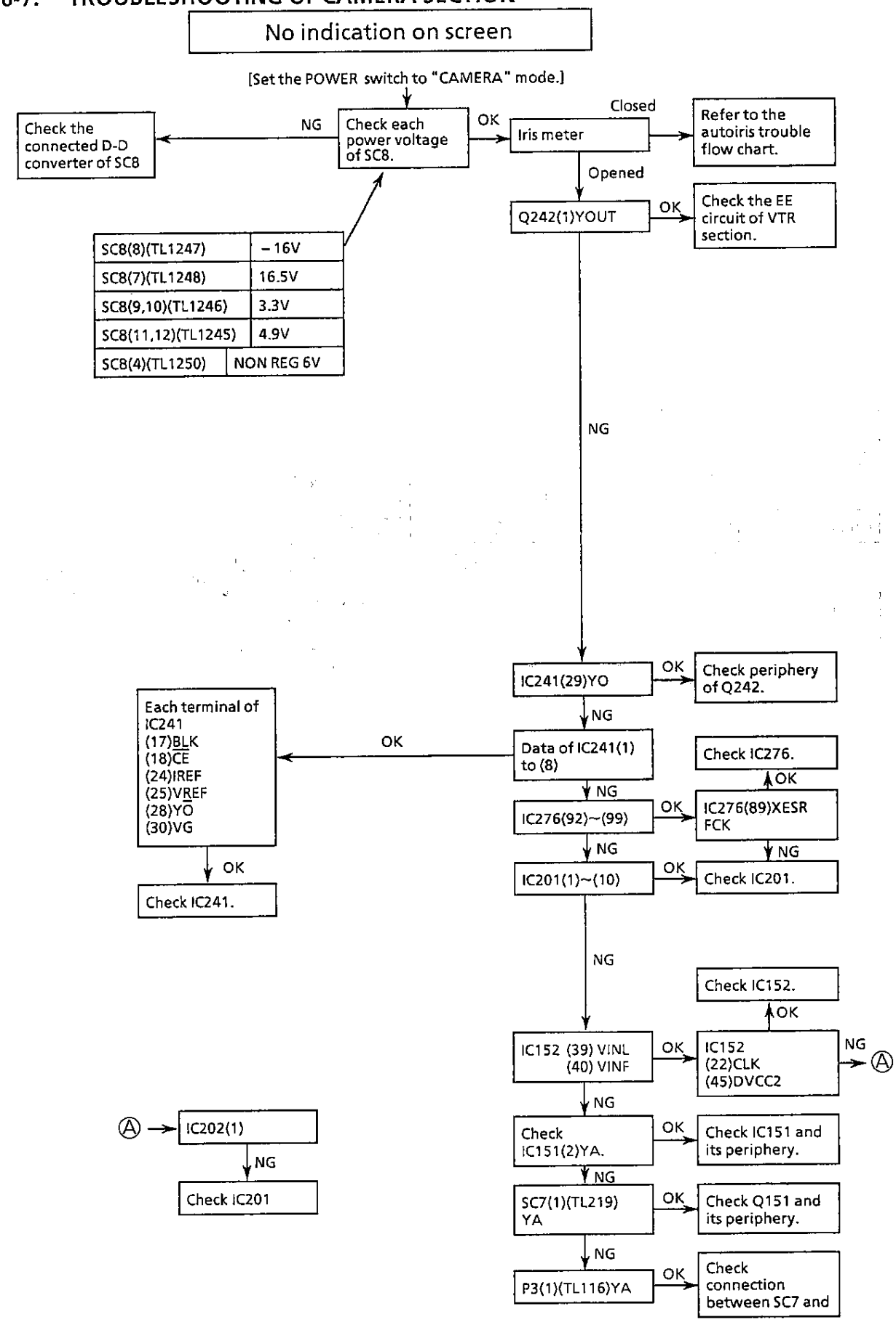
6-5. SERVO SECTION TROUBLESHOOTING

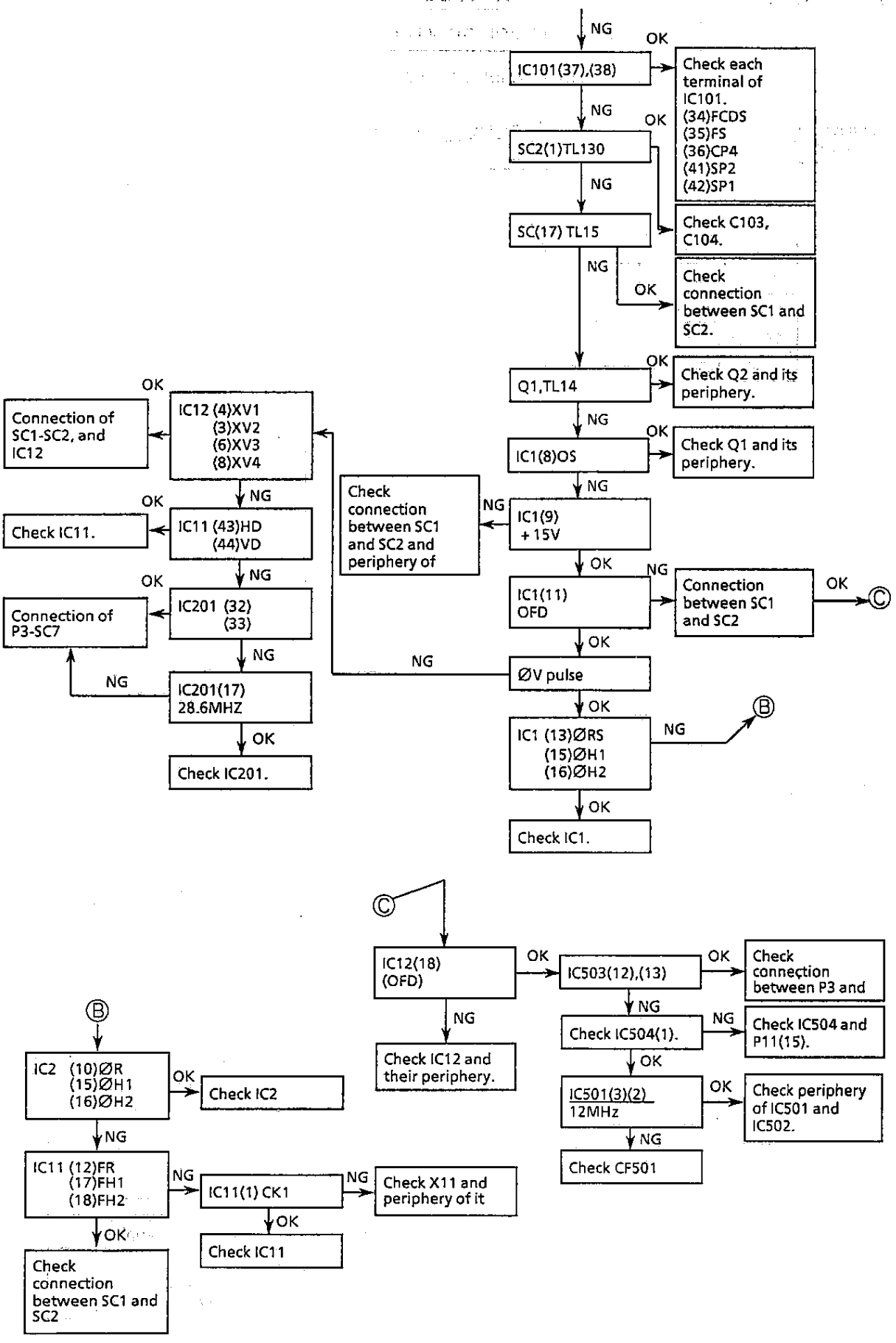
No.	Trouble	Possible cause
1	Tape runs away in the playback or record mode.	1) CAP FG is not input into the IC1701(68) pin. → Check soldering of IC1706 and peripheral circuit. → Check that 5V DC is supplied to the SC30(2) pin. 2) CAP ERR voltage (usually 1.2V DC) is excessively high. → Check IC1701(73) pin CAP PWM waveform. → Check soldering of IC706 peripheral circuit. 3) Trouble in power circuit → Check for soldering failure and short-circuiting of CAP VS and CAP ERR line.
2	The tape does not run in the playback or record mode.	1) Check whether the tape is caught. 2) CAP VS voltage is low (usually 2.1V DC). → The same check as stated in item 1-2), 3).
3	Noise or screen distortion in vertical direction in the playback mode	1) The AFT ERR waveform input into the IC1701(60) is not normal. → Check soldering of IC1702 and peripheral circuit. → Check that PB RF is sent to the IC1702(2) pin. → Check soldering of RF, head amplifier circuit.
4	Horizontal synchronization is disturbed.	1) The DRUM FG waveform input into the IC1701(67) pin is not normal. 2) The DRUM PG waveform input into the IC1701(66) pin is not normal. → Check soldering of IC1705 and peripheral circuit. → Check soldering of SC29.

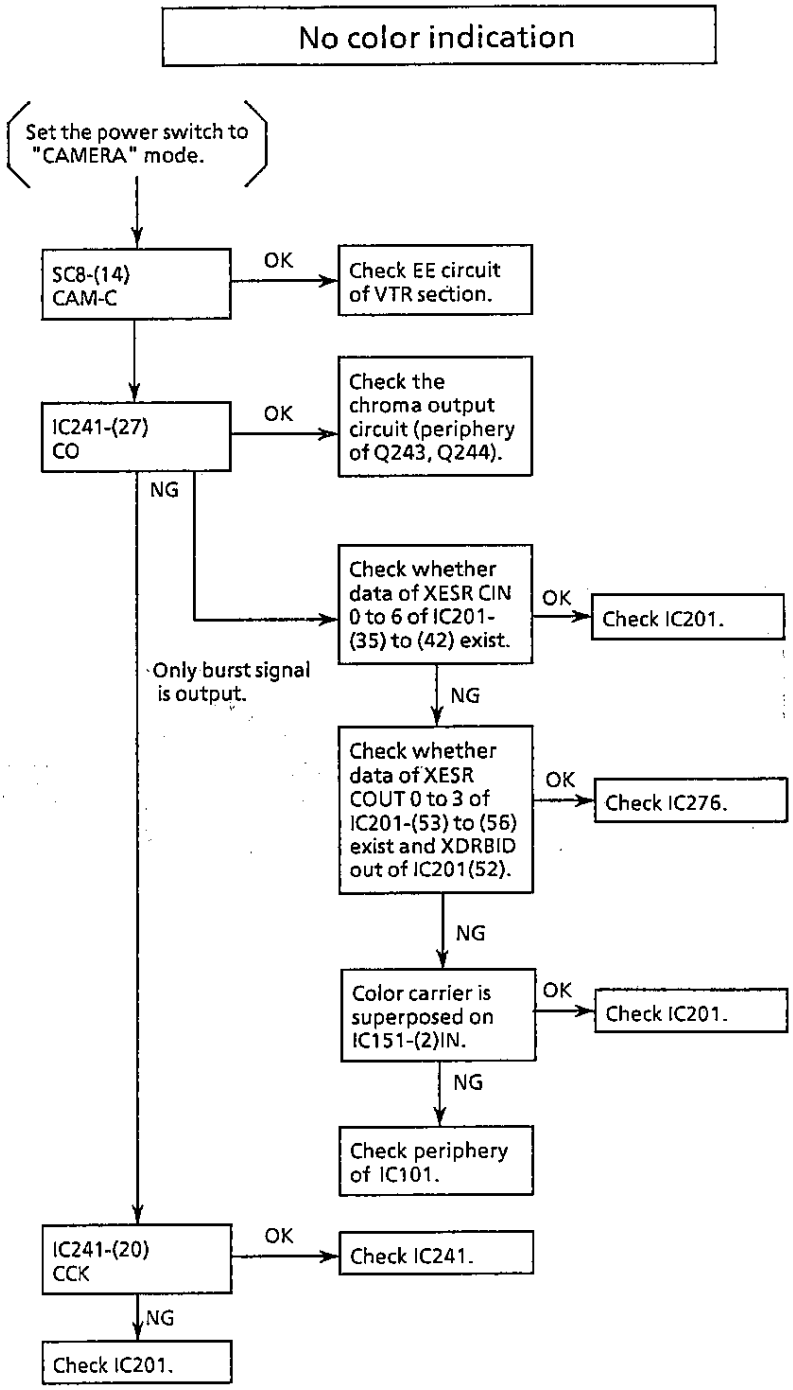
6-6. HEAD AMPLIFIER TROUBLESHOOTING

No.	Trouble	Possible cause
1	Picture cannot be recorded.	1) Check that signal is normally input into R322(REC Y), R323(REC MIX) of head amplifier circuit. Check that the control signal is normally input into specific terminal of IC. [IC301(17):L, (28), (29):H] 2) Check that the record current is normal at the terminal of TES 2. 3) Check that the record current is output at the (2), (44), (41) and (35) pins of IC301. 4) Check that the VTR head wire is not broken.
2	Playback signal is not output.	1) Check that the control signal is normally input into the specific terminal.[IC301(17):H, (28), (29):L] 2) Check that the VTR head wire is not broken. 3) Check that waveform is not obtained on FE of SC34(15) pin. 4) Clean the head with the cleaning tape.
3	Erasing is impossible.	1) Check that the Q1301 base is set to High in the record mode. 2) Check that the collector output of Q1304 is about 9Vp-p and the period is about 0.14 μs in MP tape setting state. (MP tape: about 6Vp-p, period of about 0.14 μs.) 3) Check that the erase head wire is not broken.

6-7. TROUBLESHOOTING OF CAMERA SECTION

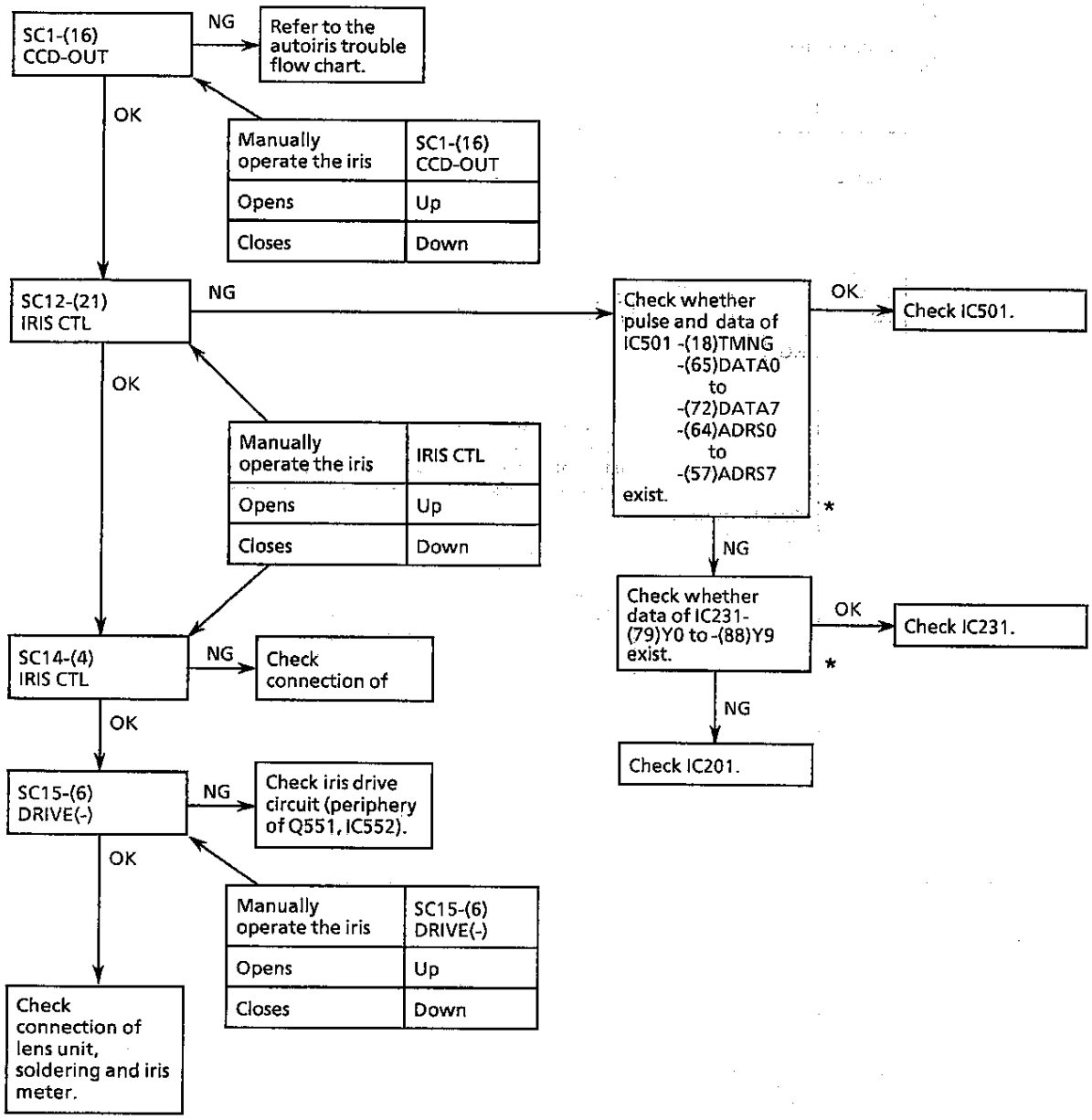



NG
IC101(37),(38)
OK
Check each terminal of IC101. (34)FCDS (35)FS (36)CP4 (41)SP2 (42)SP1
NG
SC2(1)TL130
OK
NG
SC(17) TL15
Check C103, C104.
NG
OK
Check connection between SC1 and SC2.
Q1,TL14
OK
Check Q2 and its periphery.
NG
IC1(8)OS
OK
Check Q1 and its periphery.
NG
IC1(9) +15V
NG
Check connection between SC1 and SC2 and periphery of
OK
IC1(11) OFD
NG
Connection between SC1 and SC2
OK
ØV pulse
NG
OK
IC1 (13)ØRS (15)ØH1 (16)ØH2
NG
OK
Check IC1.
IC12 (4)XV1 (3)XV2 (6)XV3 (8)XV4
OK
Connection of SC1-SC2, and IC12
NG
IC11 (43)HD (44)VD
OK
Check IC11.
NG
IC201 (32) (33)
OK
Connection of P3-SC7
NG
IC201(17) 28.6MHZ
OK
Check IC201.
IC12(18) (OFD)
OK
NG
Check IC12 and their periphery.
IC503(12),(13)
OK
Check connection between P3 and
NG
Check IC504(1).
NG
Check IC504 and P11(15).
OK
IC501(3)(2) 12MHz
OK
Check periphery of IC501 and IC502.
NG
Check CF501
IC2 (10)ØR (15)ØH1 (16)ØH2
OK
Check IC2
NG
IC11 (12)FR (17)FH1 (18)FH2
NG
IC11(1) CK1
NG
Check X11 and periphery of it
OK
Check IC11
OK
Check connection between SC1 and SC2



* To check XESR CIN and XESR COUT data buses, shoot a colored object with camera, and change this object to see whether the digital signal changes.

Autoiris trouble

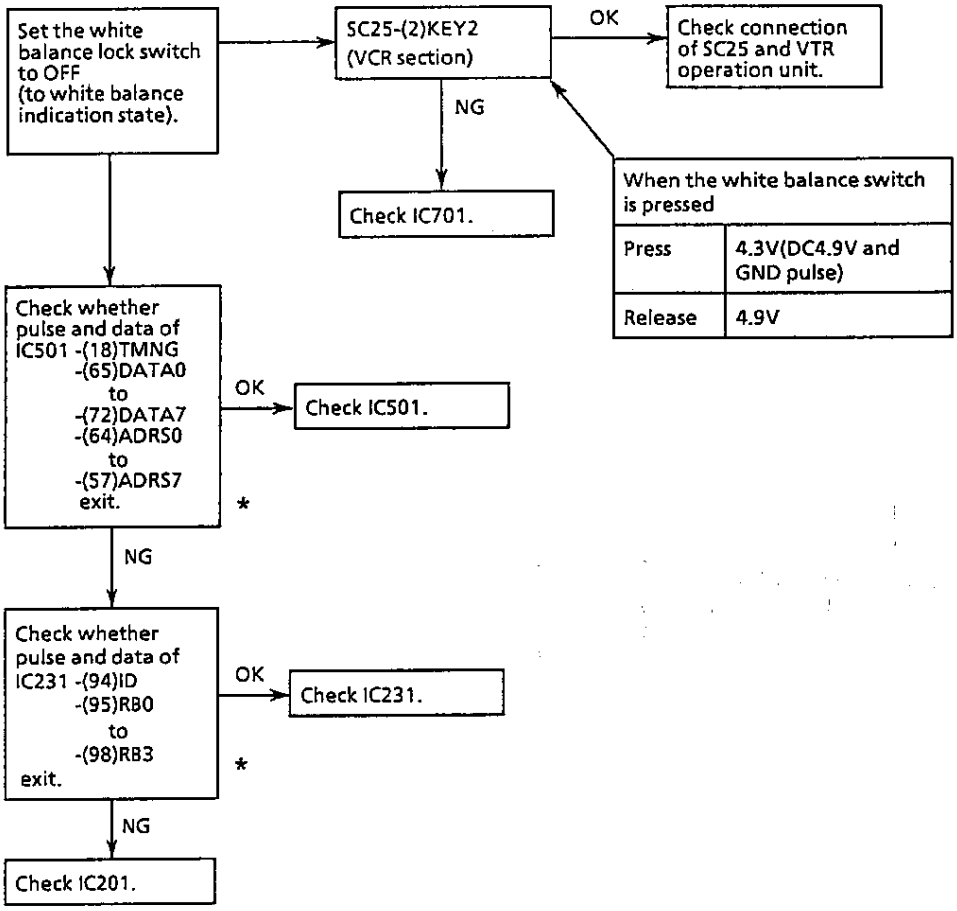


*1. To check data of IC501 DATA 0 to DATA7 and IC231 Y0 to Y7, check whether the digital signal changes when the object is changed.

2. To check IC501-(18)TMNG, check whether VD period pulse is output.

3. To check IC501ADRS 0 to ADRS7, check whether pulse is output.

Autowhite balance is abnormal.

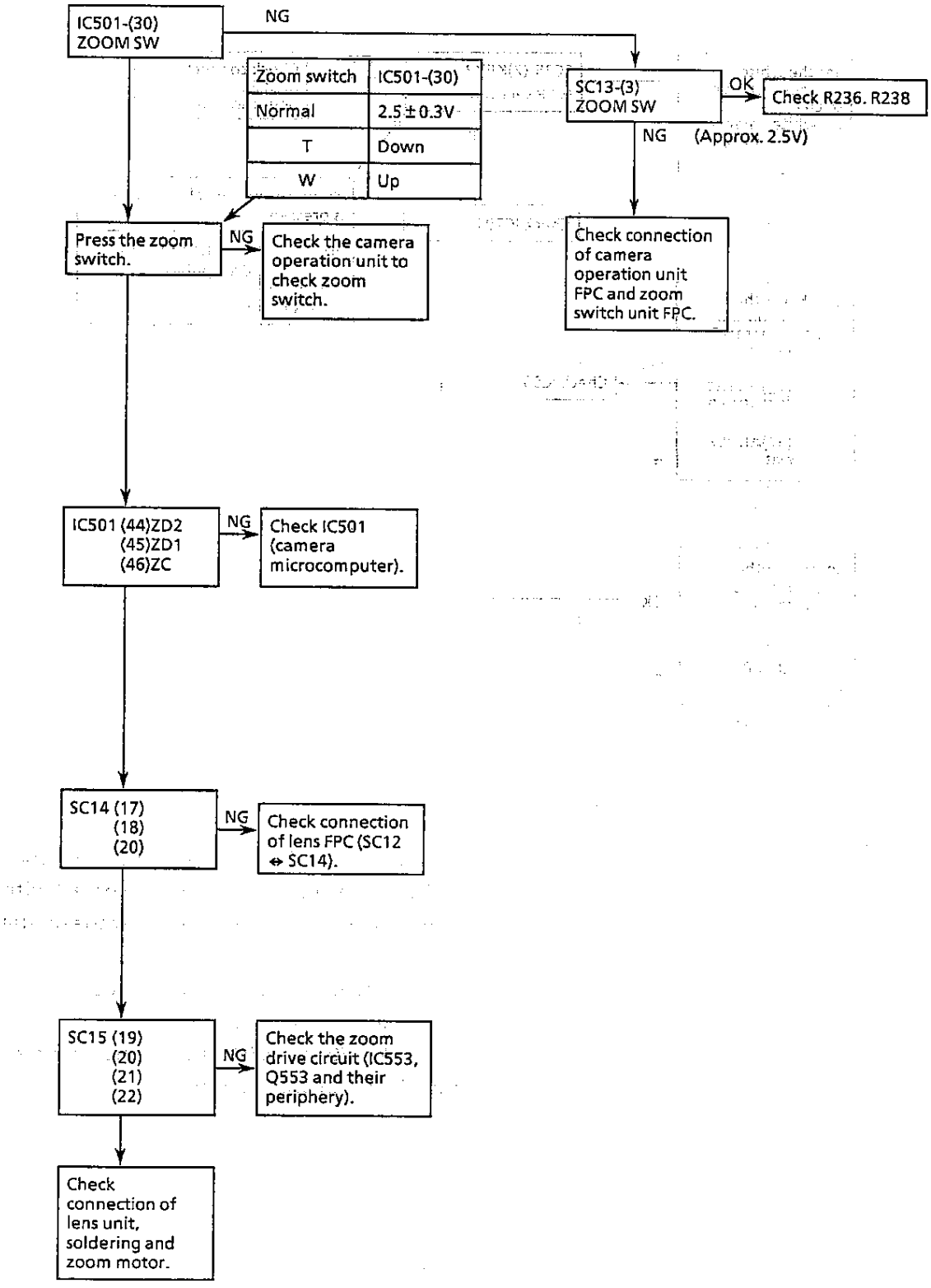


*1. To check data of IC501 DATA 0 to DATA 7 and IC231 RB0 to RB3, shoot a coloured object with camera, and move it to see whether the digital data changes.

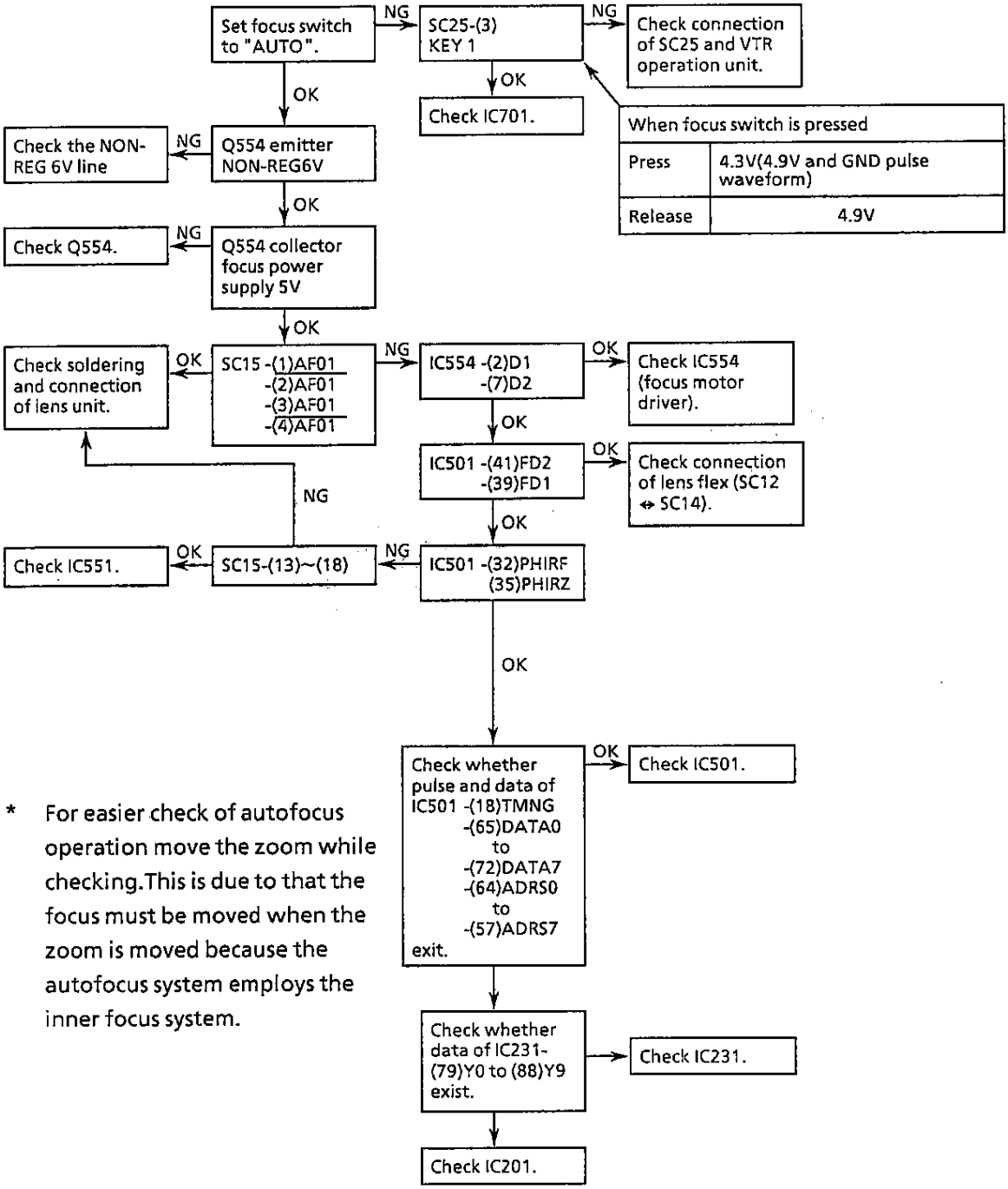
2. To check IC501:TMNG, IC231:ID, check that pulse waveform is output.

3. To check IC501ADRS 0 to ADRS7, check whether pulse is output and changes.

The power zoom does not operate.

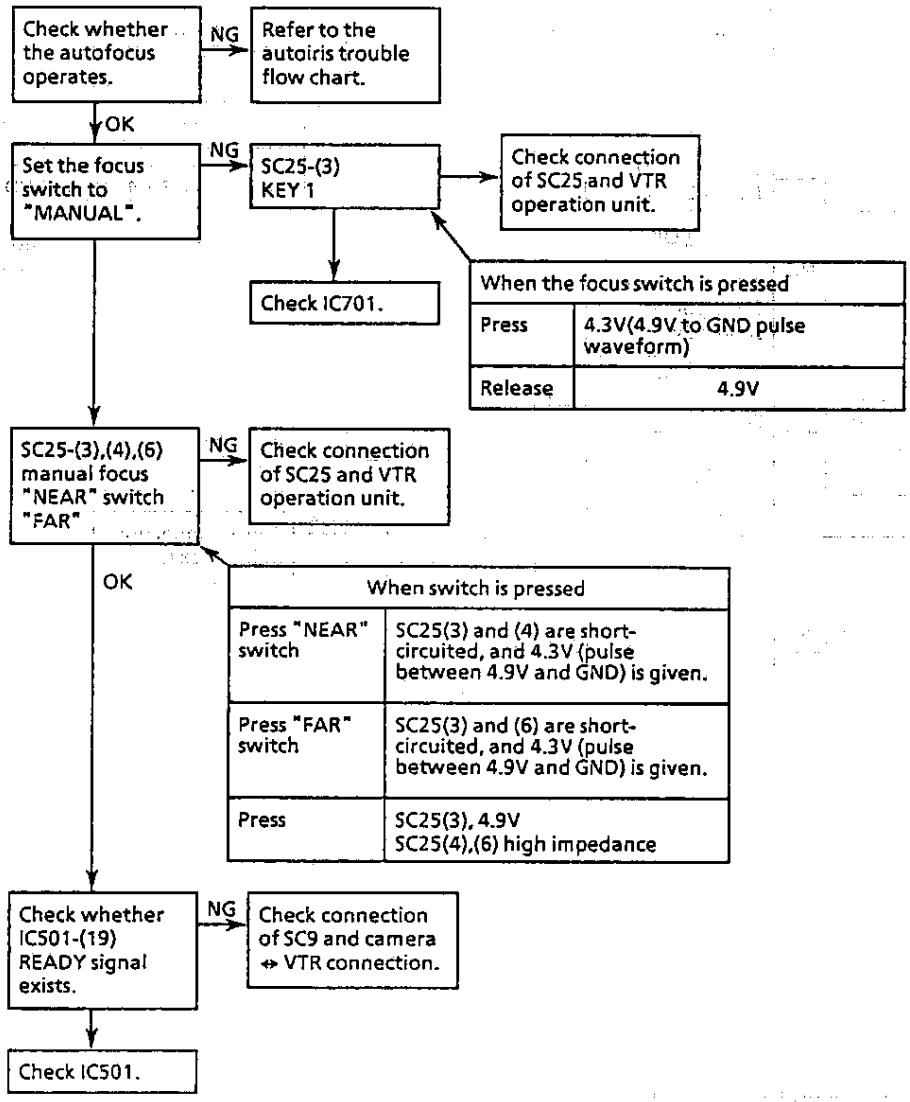


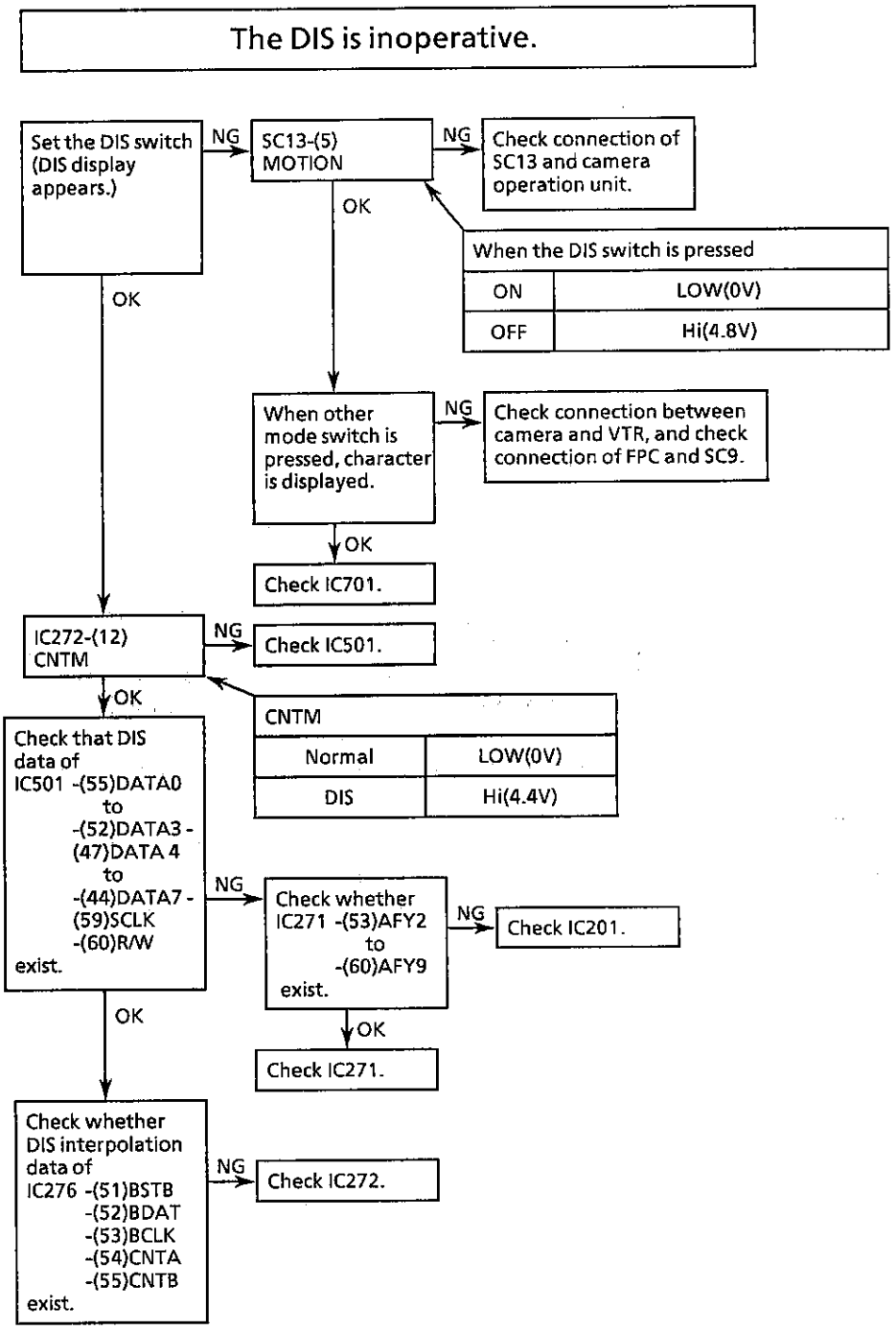
The autofocus does not operate.



* For easier check of autofocus operation move the zoom while checking.This is due to that the focus must be moved when the zoom is moved because the autofocus system employs the inner focus system.

The manual focus does not operate.


Check whether the autofocus operates.
NG
Refer to the autoiris trouble flow chart.
OK
Set the focus switch to "MANUAL".
NG
SC25-(3) KEY 1
Check connection of SC25 and VTR operation unit.
Check IC701.
When the focus switch is pressed
Press
4.3V(4.9V to GND pulse waveform)
Release
4.9V
SC25-(3),(4),(6) manual focus "NEAR" switch "FAR"
NG
Check connection of SC25 and VTR operation unit.
OK
When switch is pressed
Press "NEAR" switch
SC25(3) and (4) are short-circuited, and 4.3V (pulse between 4.9V and GND) is given.
Press "FAR" switch
SC25(3) and (6) are short-circuited, and 4.3V (pulse between 4.9V and GND) is given.
Press
SC25(3), 4.9V
SC25(4),(6) high impedance
Check whether IC501-(19) READY signal exists.
NG
Check connection of SC9 and camera ↔ VTR connection.
Check IC501.


The DIS is inoperative.
Set the DIS switch (DIS display appears.)
NG
SC13-(5) MOTION
NG
Check connection of SC13 and camera operation unit.
OK
When the DIS switch is pressed
ON
LOW(0V)
OFF
Hi(4.8V)
OK
When other mode switch is pressed, character is displayed.
NG
Check connection between camera and VTR, and check connection of FPC and SC9.
OK
Check IC701.
IC272-(12) CNTM
NG
Check IC501.
OK
CNTM
Normal
LOW(0V)
DIS
Hi(4.4V)
Check that DIS data of IC501 -(55)DATA0 to -(52)DATA3 -(47)DATA 4 to -(44)DATA7 -(59)SCLK -(60)R/W exist.
NG
Check whether IC271 -(53)AFY2 to -(60)AFY9 exist.
NG
Check IC201.
OK
Check IC271.
OK
Check whether DIS interpolation data of IC276 -(51)BSTB -(52)BDAT -(53)BCLK -(54)CNTA -(55)CNTB exist.
NG
Check IC272.

6-8. LCD DISPLAY TROUBLESHOOTING

No.	Trouble	Possible cause
1	Normal picture is not displayed.	(1) The backlight does not light. → The (6) pin connector for LCD PWB and backlight inverter unit is incorrectly fitted (SC47) or the backlight inverter unit (RUNTK0291TAZZ) or backlight unit (CLMPV0006TA01) is defective. → If voltage is not applied to the (1) pin of connector SC47, the fuse F903 has blown out or the power circuit (Q919, IC901) peripheral circuit is malfunctioning. → When the backlight lights if the backlight brightness selection switch is set to "BRIGHT", the power circuit (Q919, IC901) peripheral circuit is malfunctioning. (2) Picture is abnormal. → If video input signal of TP800 is abnormal, the Y/C circuit is malfunctioning. → If the R, G, and B output signals (TP804, TP803, TP802) of IC800 are abnormal, IC800 and peripheral circuit are malfunctioning. → The (18) pin connector for LCD PWB and LCD panel is fitted incorrectly (SC46), FPC wire has been broken or LCD panel is defective. → If power supply (4.9V. -8V, 13V, -16V) of LCD circuit is abnormal, the power circuit of VTR PWB is malfunctioning. → If the LCD common bias level (TP806) is abnormal, IC804, Q803, Q804 and peripheral circuit are malfunctioning.
2	Synchronization cannot be stabilized.	(1) Synchronization signal TP805 is abnormal. → Malfunction of IC800 or peripheral circuit. (2) TP809 PDP signal is abnormal. (Horizontal synchronization is disturbed.) → Malfunction of IC801 and VCO circuit (L805, D806, IC803) (3) Vertical synchronization is disturbed. → Malfunctioning of IC801 and vertical synchronization separation circuit (Q801) (4) The horizontal picture display position is abnormal. → Malfunction of IC801 and horizontal position compensation circuit (D816)
3	Color does not appear.	(1) Abnormal chroma VCO oscillation → IC800 and chroma peripheral circuit are malfunctioning or the crystal X800 is defective. (2) IC800 (47) pin external horizontal sync signal is abnormal. → IC801, VCO circuit and peripheral circuit are malfunctioning. (3) IC800 R, G and B output signals (TP804, TP803, TP802) are abnormal. → Malfunction of IC800 and chroma peripheral circuit. (4) When the color density is changed, voltage of color gain control terminal IC800(11) pin does not change. → Malfunction of Y/C-D/A converter circuit. (IC5403)

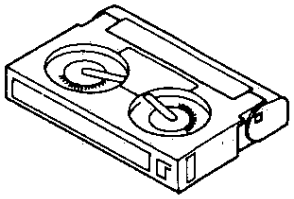
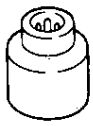
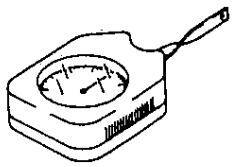
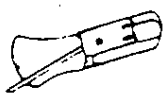
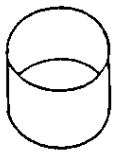
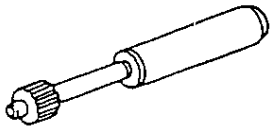
No.	Trouble	Possible cause
4	Abnormal color The color phase shading at each line is large. (Line crawl is large.)	(1) In the burst phase adjustment, the 3 pin DC voltage of the variable capacitor diode (D817) does not change. → Malfunction of Y/C-D/A converter circuit. (IC5403) (2) In the burst phase adjustment, the above Voltage Changes and the phase shading does not become small. → Malfunction of ic800 and D817
5	ON-SCREEN (NON REC character) does not appear.	(1) The IC801(12) pin HD signal and IC801(15) pin VD signal are not output or abnormal. → Malfunction of IC800 and peripheral circuit (2) The OSR, OSG, OSB, NON REC BLK signals are not output or abnormal. → Malfunction of IC704 and peripheral circuit (3) Although the NON REC BLK signal is input into the IC800(1) pin, ON-SCREEN does not appear. → IC800 is defective.
6	ON-SCREEN (NON REC character) color does not appear.	(1) The OSR, OSG and OSB signals are not output. → IC704 and peripheral circuit (2) The OSR signal is input into the IC800(5) pin and ON-SCREEN RED does not appear.The OSG signal is input into the IC800(4) pin, and ON-SCREEN GREEN does not appear. → Malfunction of IC800 (3) ON-SCREEN white character is not white.Malfunction of IC800 and ON-SCREEN peripheral circuit.
7	LCD indication	(1) Vertical inversion is not performed. → If H/L switching of LCD REV signal is disabled, mounting of LCD REV SW or connector P27 is improper. → If the LCD REV signal is switched correctly, the IC801 or LCD panel is defective.

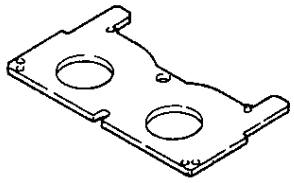
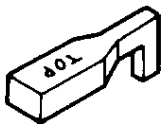
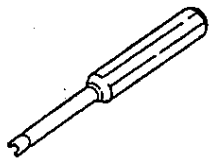
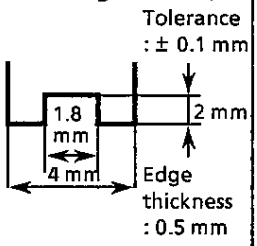
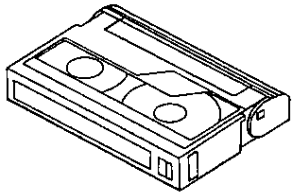
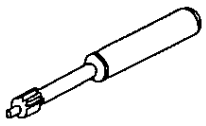
7. ADJUSTMENT, REPLACEMENT AND ASSEMBLY OF MECHANICAL UNITS

7-1. MECHANISM CHECKING/ADJUSTING JIGS, TOOLS, AND PARTS

7-1-1. MECHANISM CHECKING/ADJUSTING JIGS AND TOOLS

Note: N indicates the new jigs.

No.	Name	PART No.	Code	Configuration	Remarks	Note
1.	Cassette Torque Meter for PB	JiG8T-012	CV		• (10 g·cm/25 g·cm)	
2.	Cassette Torque Meter for VS-REW	JiG8T-032	CV		• (50 g·cm/25g·cm)	
3.	Torque Gauge (45 g·cm)	JiGTG0045	CN		• Used for loading brake torque measurement.	
4.	Torque Gauge Head	JiGTH-MX7U	BS		• Used on the torque gauge listed above.	
5.	Dial Tension Gauge (10 g)	JiGDT-10G	BW			
6.	Lock Brake Measuring Reel	—	—		• ϕ20 mm with a string (See page 7-3.)	—
7.	Tension Gauge (400 g)	JiGSG0400	BK		• Used for measuring the pinch roller pressure.	
8.	Pinch Roller Pressure Measuring Tape	—	—		• ϕ20 mm (60-mm length), 8-mm width (See page 7-3.)	—
9.	Gear Type Driver	JiGDRiVERMX7U1	BL		• Used for manually operating the mechanism.	
10.	Torque Driver (1.5 kg·cm)	JiGTD1500RTDH	CB			

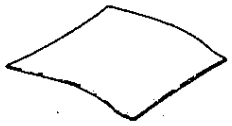
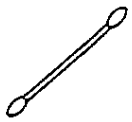
No.	Name	PART No.	Code	Configuration	Remarks	Note
11.	Torque Driver (0.2 kg·cm)	JiGTD-200AMLD	**		• Minus-shaped bit, 0.14 mm (Edge thick.) × 1.5 mm (Width)	—
12.	Master Plane	JiGMP-MX7U	CG		• Used for Tu guide height adjustment. • Used for T roller verticality check. • Used for Reel disk height check.	
13.	Height Adjusting Jig	JiGGH-MX7U	BV		• Used for Tu guide height adjustment. • Used for T roller verticality check.	
14.	Guide Roller Height Adjusting Driver	JiGDRiVERHMX7U	BU		• Bit shape (See the Fig. below.) 	
15.	Alignment Tape ★	Y/C, Audio ADJ. JiGWR5-9CS	BR			
		Y/C ADJ. JiGWR5-8CSE	BY			
		Transit ADJ. JiGWR2-1CP or VR2CBOPS	CS			
16.	T Roller Position Adjusting Driver	JiGDRiVERMX7U2	BN			
17.	Others (1) Calipers (2) High-precision screwdrivers (Plus and minus) (3) Radio pliers (With thin jaws) (4) A pair of tweezers	—	—			—

★**Note:**
JiGWR2-1CP and JiGWR5-1CP are compatible.
To use them, Perform the running adjustment according to the Service Manual for VL-MX7S/H/X/MX98E.

<Making the mechanism check/adjustment jigs>
For jig item No 6 and 8 listed on the preceding page

1. Lock brake force measuring jig
   1) Prepare an 8 mm cassette tape commercially available.
   2) Use the reel around which the tape is wound clockwise. Make the tape winding diameter 20 mm.
   3) Fix a 200-250 mm long thread (thin enough to come into the hole of the dial tension gauge's measuring probe) at the end of the tape with Scotch tape or the like.
      * It is practical to use the end hole of the tension gauge when measuring.
2. Pinch roller pressure measuring tape
   1) Prepare an 8 mm tape commercially available.
      Cut it to about 60 mm long.
   2) Fix both ends of the tape with Scotch tape or the like to form a circle as shown above.

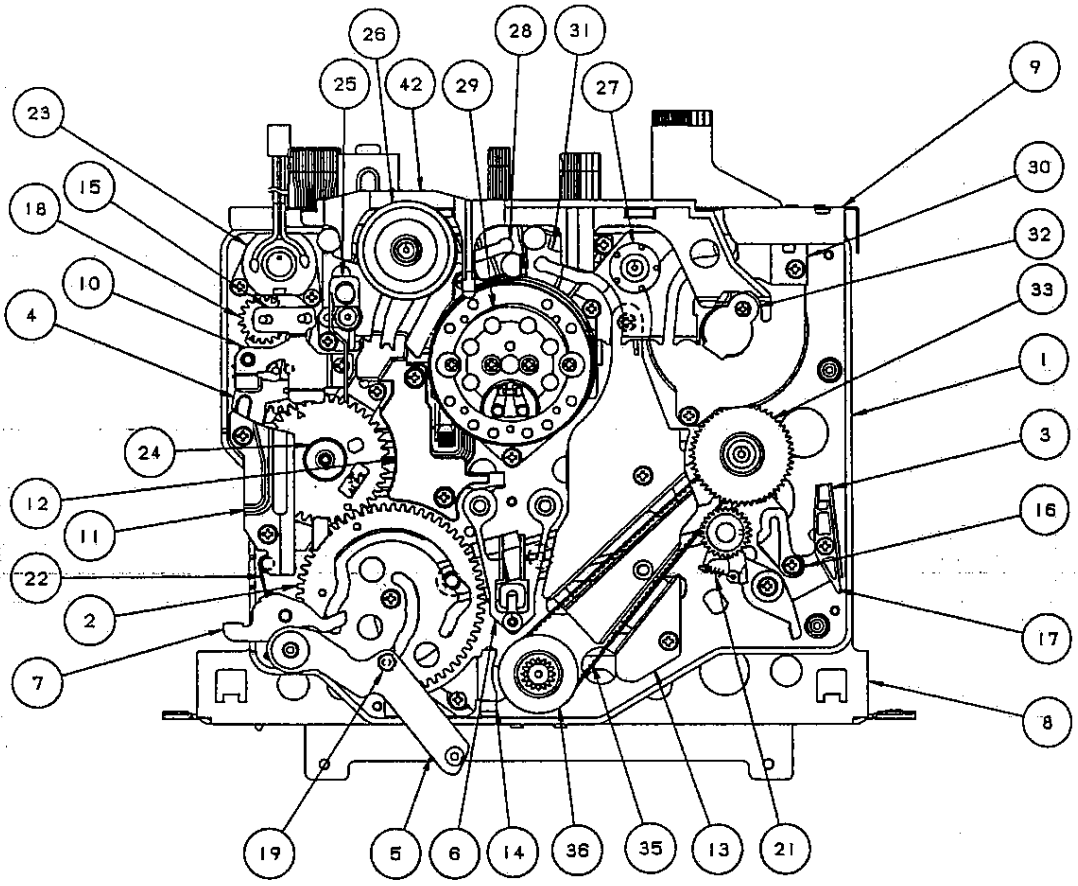
7-1-2. PARTS FOR PERIODICAL INSPECTION AND MAINTENANCE

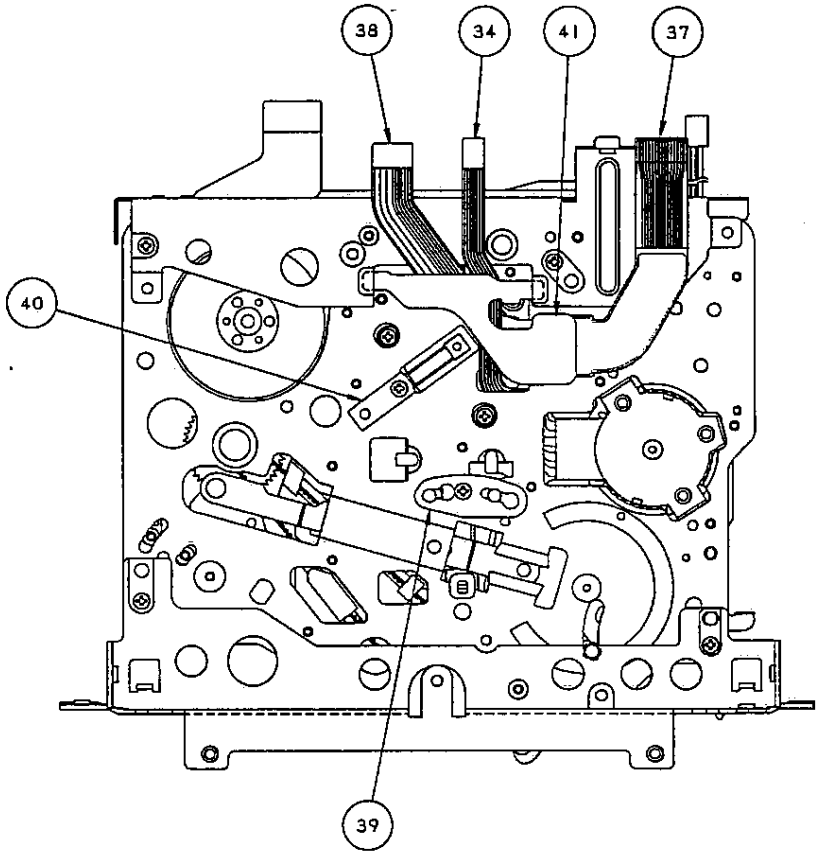
No.	Name	PART No.	Code	Configuration	Remarks	Note
1.	Oil ① COSMO HYDRO HV22 ② COSMO HYDRO HV100	—	—	—	• COSMO PETROLEUM CO., LTD.	
2.	Cleaning Paper	JiGDUSPER	AP		• DUSPER Σ (Sigma) of OZU Co., Ltd.	
3.	Superfine Swab	—	—			
4.	Grease (MORYCOAT X5-6020)	—	—	—	• DOW COANING	
5.	Screw Locking Agent (1401B)	—	—	—	• THREE BOND	
6.	Cleaning Liquid (Industrial-Use Ethyl Alcohol)	—	—	—		

7-2. MECHANICAL PARTS LIST

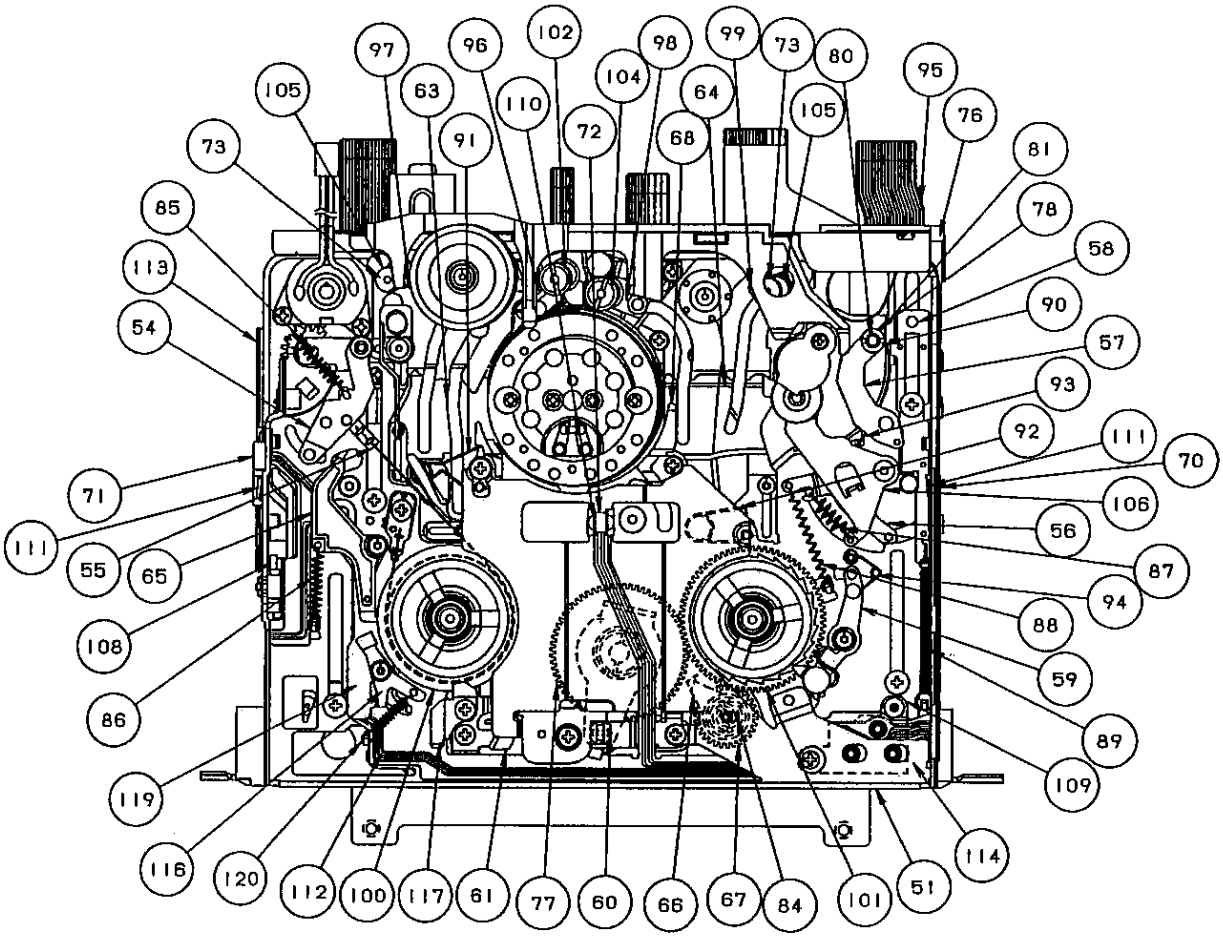
No.	Name	No.	Name
1	Main chassis 2 ass'y	62	Down-SW retaining angle
2	Main cam	63	Slide rail L
3	Pinch drive lever ass'y	64	Slide rail R
4	T arm operating lever 2 ass'y	65	Main brake
5	SL chassis drive lever	66	Lock brake lever
6	Loading pressure lever ass'y	67	Lock brake gear
7	Eject lever 2	68	PB protector
8	HL mechanism frame F	69	PBS2 slider
9	HL mechanism frame R	70	Start sensor holder
10	T cam	71	End sensor holder
11	T arm rail L	72	LED spacer
12	S loading arm support	73	GRT2 cap
13	T loading arm support		
14	SL chassis drive lever support		
15	T cam holder	76	Relay FPC retainer
16	EOT operation lever guide	77	Swing arm ass'y
17	P guide rail	78	Tu guide
18	Loading gear ass'y		
19	Cam roller	80	Tu guide upper flange
		81	Tu guide lower flange
21	EOT release lever spring		
22	Eject lever spring	83	PBS1 slider
23	Loading motor ass'y	84	Lock brake spring
24	Mode SW	85	T arm spring
25	S stopper -H ass'y	86	Main brake spring
26	SI roller ass'y	87	Pinch pressure spring
27	TS roller ass'y	88	Pinch release spring
28	Drum base ass'y	89	Tu guide operating spring
29	Drum ass'y	90	Tu guide adjusting spring
30	Tu stopper ass'y	91	Slide rail L spring
31	PBT1 holder spring	92	Slide rail R spring
32	Capstan motor	93	Tu guide arm spring
33	Relay gear ass'y	94	Tu ratchet spring
34	Dew sensor ass'y	95	Relay FPC-L 2
35	Timing belt	96	Pole base S1 ass'y
36	Drive gear	97	Pole base S2 ass'y
		98	Pole base T1 ass'y
		99	Pole base T2 ass'y
39	Pressing lever holder	100	S reel disk ass'y
40	Earth brush ass'y	101	Tu reel disk ass'y
41	FPC holder	102	Guide roller S1 ass'y
42	Tape guide		
		104	Guide roller T1 ass'y
		105	Guide roller T2
		106	Pinch roller lever ass'y
		107	Damper
		108	Cassette control down SW
		109	Recognition SW -T
		110	Cassette LED
		111	S/E sensor
51	Slide chassis ass'y	112	Sensor FPC ass'y
52	S loading arm ass'y	113	SL guide angle
53	T loading arm ass'y	114	LED holding angle
54	Tension arm ass'y	115	Down guide
55	Tension wire ass'y	116	L brake
56	Pinch double acting lever ass'y	117	Reel stopper
57	Tu guide arm ass'y	118	Dumper retainer
58	Tu holding guide operating plate	119	L brake operation lever
59	Tu ratchet ass'y	120	L brake spring
60	Reel lock release angle ass'y		
61	Slide adjusting angle	130	Cassette control ass'y

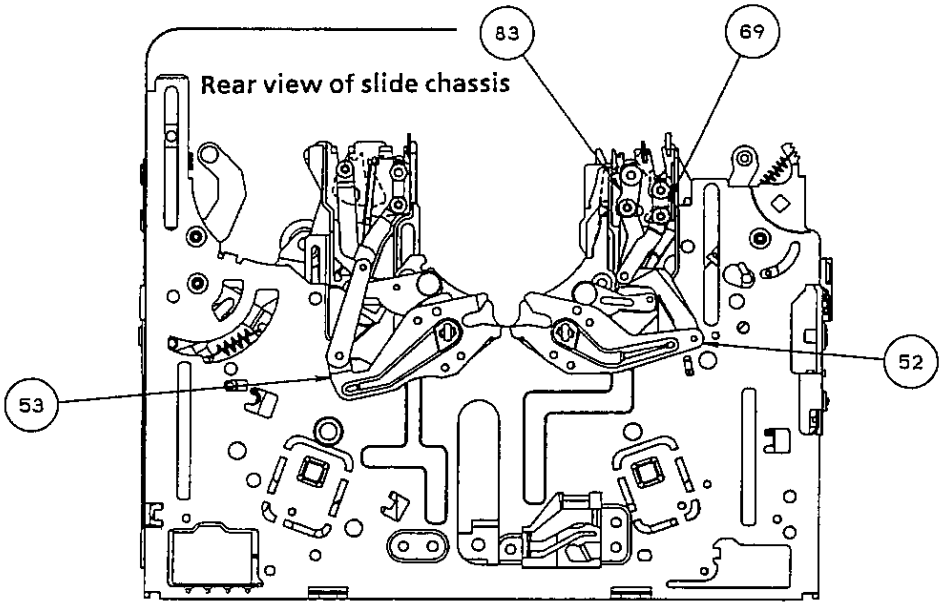
MAIN CHASSIS ASS'Y



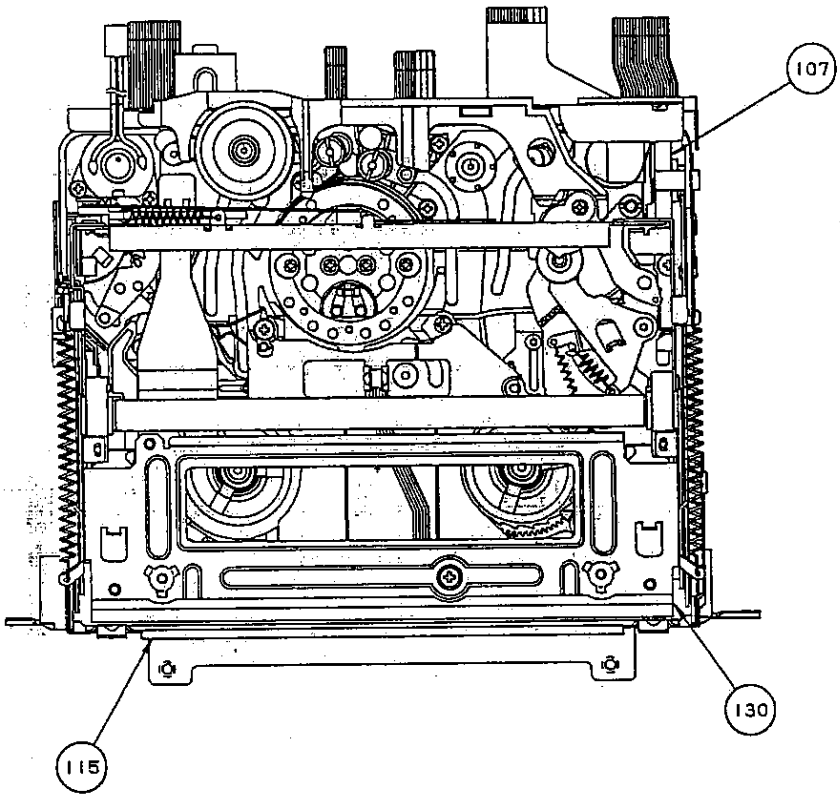


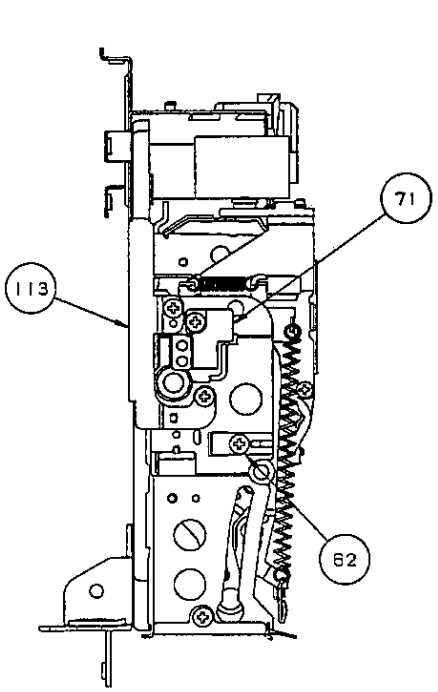
SLIDE CHASSIS ASS'Y

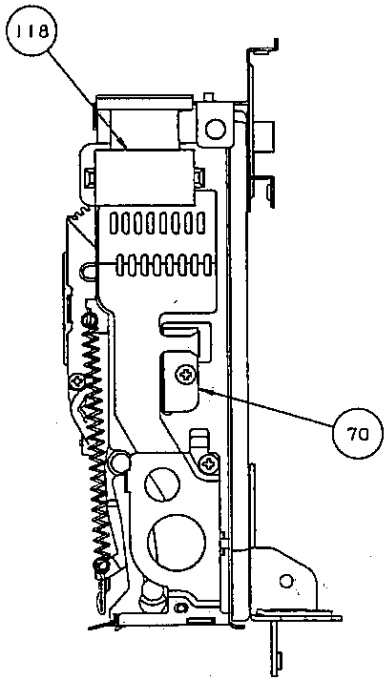




OTHER PARTS







7-3. ITEMS AND TIMINGS OF INSPECTION AND MAINTENANCE

The mechanism of the VCR requires the below described periodical inspection and maintenance work in order that it maintains its high quality. Also, whenever you repair the machine, give it the below listed maintenance and checkings after the repair, regardless of how long it has been used.

7-3-1. INSPECTION AND MAINTENANCE LIST

	Checking/ Maintaining Point	Hours the VCR Was Used					Possible Symptom Encountered	Remarks
		500	1000	1500	2000	3000		
Tape travel system	Tape traveling route (See Section 7-3-2.)	□	□	□	□	□	• Lateral noise. • Unclean head. • Screen shakes.	Rollers: • If found rotating abnormally or deflecting too much, replace the roller. Other than rollers: • Clean the tape contacting areas. Be sure to use the specified cleaning agent.
	Drum (See Section 7-3-3.)	□	□	□	□	□		
	Video head	□	□○	□	□○	□○	• Unsatisfactory SN ratio. • No colour appears.	
Driving system	Timing belt	—	※	—	※	※	• Tape does not travel. • Tape slackens. • Screen shakes.	• Replace if found having a trouble.
	Pinch roller	□	□	□	□○	□		
	Capstan D.D. motor	—	—	—	○	—		
	Relay gear shaft	—	△	—	△	△	• Unusual sound.	• Apply oil. (Oil: COSMO HYDRO HV100)
	Drive gear shaft	—	△	—	△	△		
	Loading motor	—	—	—	※○	—	• Not ejectable. • Does not get into mode.	• Replace if found having a trouble (such as abnormal sound or other).
Perform-ance check	Abnormal sound	※	※	※	※	※		
	PB/VS-REW take-up torque	—	※	—	※	※		• If not adjustable within the standard range, replace.
	PB/VS-REW back tension torque	—	※	—	※	※		
	Loading brake	—	※	—	※	※		
	Lock brake	—	△	—	△	△		

○: Replace. □: Clean. △: Apply oil. ※: Check.

Oil: COSMO HYDRO HV22 or HV100
Grease: MORYCOAT X5-6020
Screw locking agent: THREE BOND 1401B
Cleaning liquid: Industrial-use ethyl alcohol

7-3-2. CLEANING THE TAPE TRAVEL SYSTEM

1) Clean the tape travel areas (i.e. the points ① thru ⑫, pinch roller, capstan shaft, and lower drum) with a superfine swab with the cotton wound on the ends dry.
2) If dry cleaning does not remove dirt, use the superfine swab soaked to the desired degree with cleaning agent (industrial-use ethyl alcohol).

Notes:

1. When cleaning the rollers, exercise due care not to let any foreign matter or cleaning liquid get into the roller shaft areas.
2. Do not soak the swab with too much cleaning liquid. Excessive amount of cleaning liquid may cause a trouble.

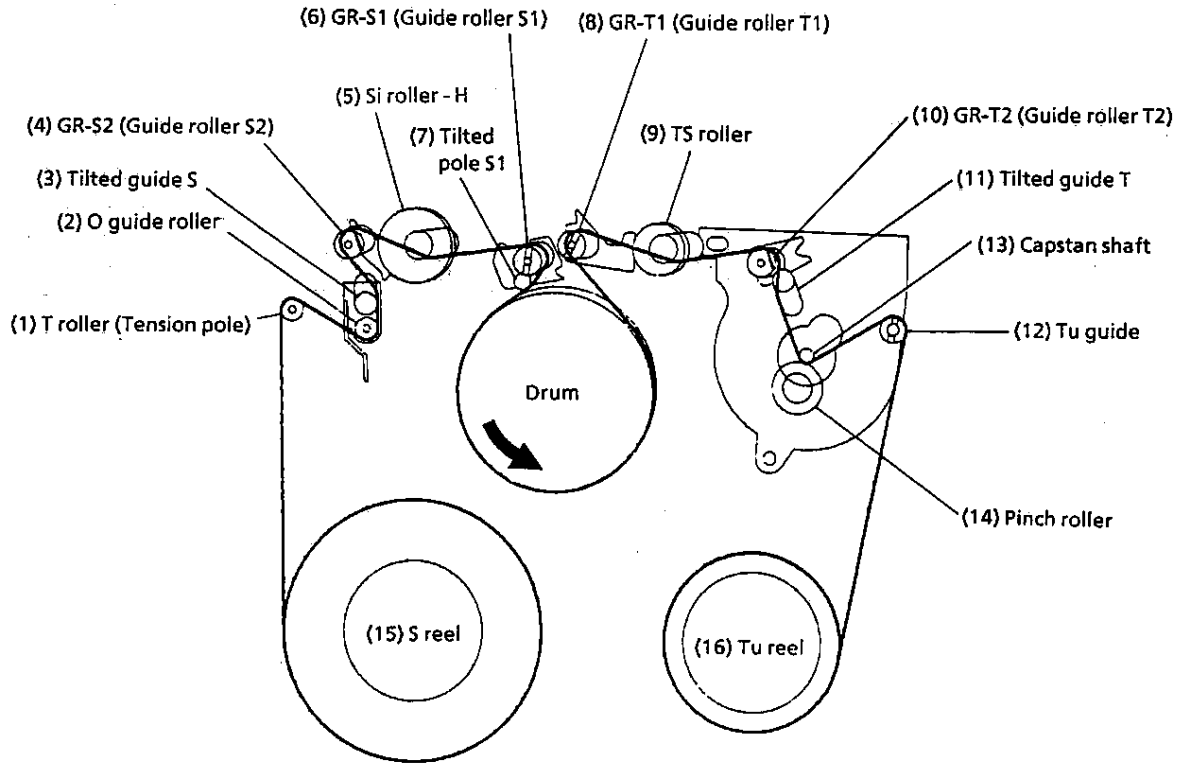


Figure 7-3-2. Tape Guide Allocation in Tape Travel System

7-3-3. CLEANING THE DRUM ASS'Y

Prepare the cleaning paper (JiGDUSPER) made wet to the desired degree with industrial-use ethyl alcohol. Gently apply that paper to the drum ass'y. Using the fingers, slowly turn the upper drum ass'y counterclockwise to clean the drum.

Notes:

1. Do not run the motor by using the electric power. Also, do not turn the drum clockwise when using fingers.
2. Moving the cleaning paper vertical with the head may damage the head. Never move it vertically.
3. Never use other than the specified cleaning paper (JiGDUSPER). Otherwise, the head may get damaged.

7-3-4. NOTES AND CAUTIONS

1) Any cut washers, once removed for parts replacement or for other reason, should be replaced with new ones.
2) The mechanism of this VCR does not involve any volume adjustment. If the specified range is not satisfied, either cleaning or replacing the parts is required. For parts replacement, see "7-5. Mechanical Ass'y/Parts Removal, Reinstallation, and Replacement".
3) Oils
   a) Be sure to use the specified oils (Different viscosity may cause troubles).
   b) For the bearings, be sure to use oil that is free from dust and other foreign matters. (Dust or other foreign matter contained in the oil may become a cause of wear or seizure of the bearings.)

c) A drop of oil indicates the amount on a needle end as shown by the Fig.6-3-4(a)

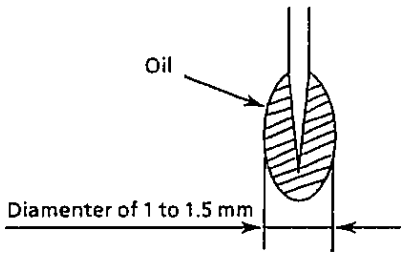


Figure 7-3-4(a).

4) Exercise caution not to give any deformation as a whole. Especially, a great care should be exercised when handling the cassette control ass'y. When moving or carrying the finished mechanism or chassis, do not hold the slide chassis or the cassette control ass'y because it appears the most convenient to hold.

Mechanism:
Be sure to move or carry the mechanical unit by holding the both sides of the mechanism frames F and R (Exercise caution not give them a bend).
Chassis (with the MD frame):
Be sure to hold the MD frame when carrying the chassis.

5) The mechanism must have the mechanism holding frame mounted when placed upright or upside down for repairing circuits.
6) For operating the mechanism alone, either use the motor (whose terminal-to-terminal voltage is 5 V or lower) or use the geared driver (JiGDRiVERMX7U1).
7) Exercise caution not to accidentally unhook the springs of the cassette control ass'y by catching on them (Four springs. See Fig. 7-3-4(b)).
8) For loading (For pressing down) the cassette control ass'y, be sure to press it at Area Ⓐ as shown in Fig. 7-3-4(b).

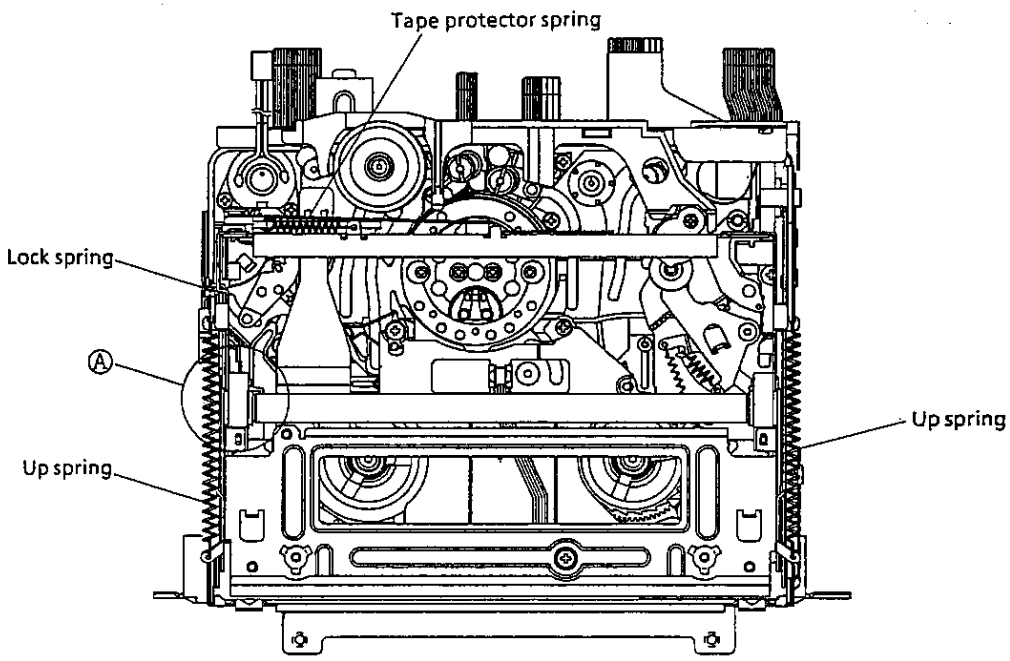


Figure 7-3-4(b).

7-4. MECHANISM CHECKS AND ADJUSTMENTS

The descriptions given here are related to the general field services, but not to related to the adjustment and replacement that require the highlevel equipment, jigs, and technical skills.
In order to maintain the initial characteristics of the machine, it is an absolute must not to give any damage to the tape and other parts as well as to give the machine the inspection and maintenance described here. Also for that purpose, be sure to use the jig in the adjustments that require such jigs.

<Notes and Cautions>

1) Before starting mechanism checks and adjustments, install the mechanism frames R and L in the mechanism unit.
2) For mechanism checks and adjustments, be sure to use the AC adaptor as the power supply.
3) For running the tape, be sure to install the cassette control ass'y (See Section 7-5-1). (If the cassette control ass'y expects to be removed subsequently after its installation, it is convenient to have the lock washers left removed when installing the ass'y.) Do not forget to install the damper when installing the ass'y (You can leave the down guide ass'y removed).

7-4-1. CHECKING THE REEL DISK HEIGHT

1) Referring to Section 7-5-1, remove the cassette control ass'y.
2) While exercising due care not to let the master plane touch the tape contacting areas such as the drum and the guide rollers, position the master plane in such manner as that the two guides (whichare shown by Ⓐ and Ⓑ in Fig. 7-4-1(b)) get in the holes of the master plane, then properly set it in the mechanism.
3) Using slide calipers or other appropriate instrument, check that the distance from the top of the master plane to the reel support surface of the S/Tu reel disk is within the specified range.

Note:
For the measurement, do not apply an excessive force to the reel support surface of the reel disk. Otherwise, accurate measurement cannot be expected due to inclination of the reel disk.

4) If the measurement is not within the specified range, replace the reel disk ass'y (See sections 7-5-4 and 7-5-5).
5) Check the above in the following two modes.
   a) Standby mode
   b) Playback/Recording mode

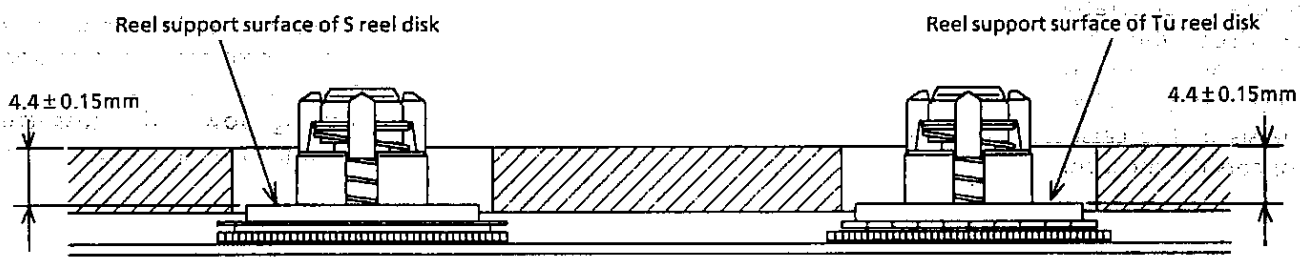


Figure 7-4-1(a).

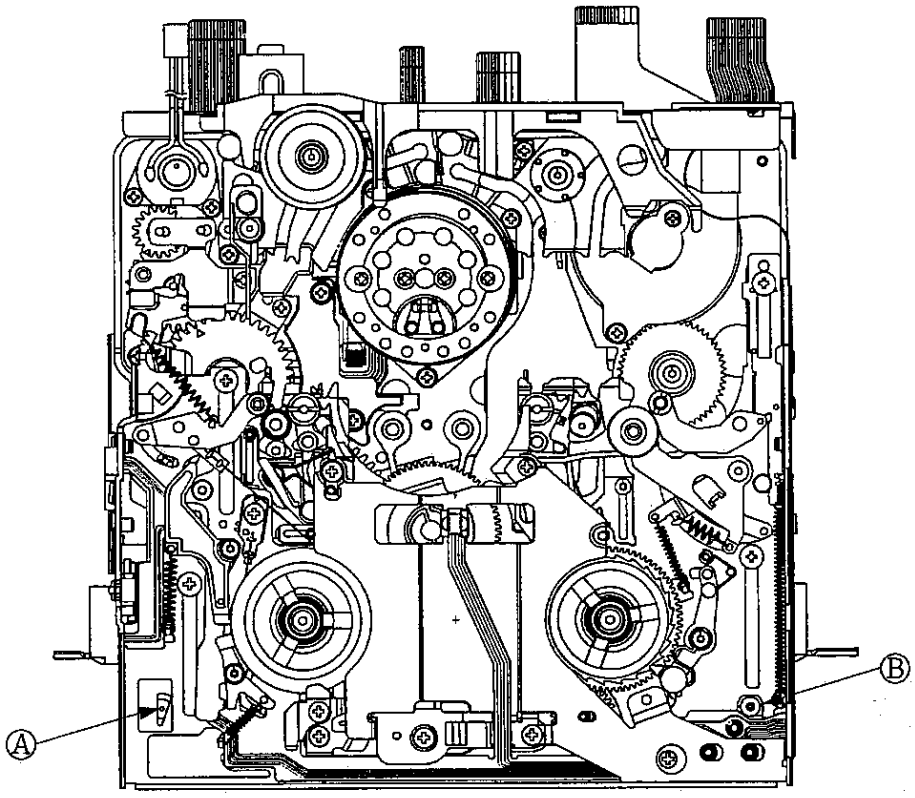


Figure 7-4-1(b).

7-4-2. CHECKING THE TAKE-UP TORQUE FOR PLAYBACK/RECORDING

1) Set the cassette torque meter (JIG8T-012) in position, then check in SP-mode recording mode (in playback mode for the tape on which signals have already been recorded) that the torque at the tape taking-up side is within the standard range.

Standard of Take-up torque for SP-mode recording/playback:
11 ± 5 g·cm with ripples of below 4 g·cm. (If the torque indicated ripples, read the torque between the ripples.)

7-4-3. CHECKING AND ADJUSTING THE BACK TENSION TORQUE FOR PLAYBACK/RECORDING

• Checking

1) Set the cassette torque meter (JiG8T-012) in position, then check in SP-mode recording mode (or in playback mode for the tape on which signals have already been recorded) that the torque at the tape supply side is within the standard range.
Standard of back tension torque for SP-mode recording/playback:
5 ± 0.5 g·cm with ripples of below 0.5 g·cm.

• Adjustment

1) If the back tension torque is not within the standard range, change the T arm spring hooking position for adjustment. That is, change it to the position nearer to you when the torque exceeds the range, or to the position further from you when it is below the range.
2) After adjustment, apply an appropriate amount of the screw locking agent (1401B of THREE BOND) to the new spring engaging part.

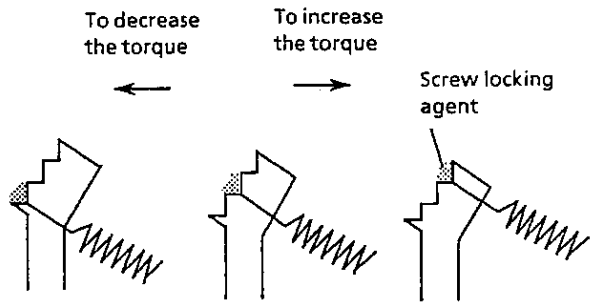


Figure 7-4-3.

Notes:

1. After back tension adjustment, be sure to check the T roller position.
2. When using the screw locking agent, take due care not to let it adhere to other parts (especially when it threads after applied).

7-4-4. CHECKING AND ADJUSTING THE T ROLLER POSITION

• Checking the Position

1) Check that the T roller is in the specified position at the start of taking up the P6-120 (See Fig.7-4-4(a)).
Simplified way of position check:
Check that the edge of the tension arm ② is located at the center of the T arm operating lever shaft ①, as shown by Fig. 7-4-4(b).
2) If not in the specified position, remove the cassette, and adjust the position in the following procedures:

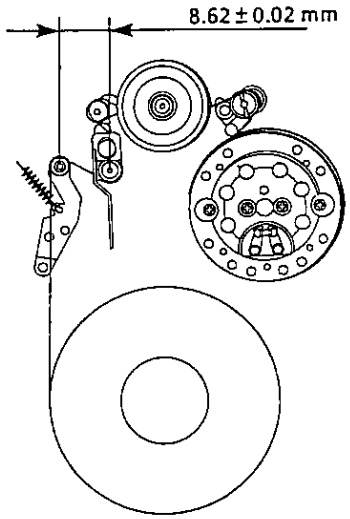


Figure 7-4-4(a).

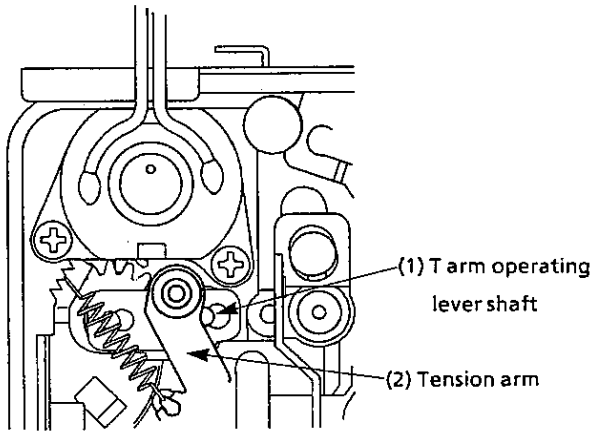


Figure 7-4-4(b).

• Adjustment

1) Put the machine in playback/recording mode (Leave the cassette removed).
2) Turn off the power (Not by turning off the power switch but by turning off the AC adaptor power).
3) Loosen the screw ① to such degree that the T adjusting plate ② becomes movable.
4) If the T roller is located inward to the specified position, move the T adjusting plate ② in the direction of arrow Ⓐ. If located outward to the specified position, move it in the direction of arrow Ⓑ. Then tighten the screw ①. (For the amount of moving the adjusting plate, use the location 0.1 to 0.4 mm outward to the specified position as the criterion.) For this positional adjustment, it is convenient to use the T roller position adjusting driver (JiGDRiVERMX7U2). Set it in the hole Ⓒ when using it.
5) Check the T roller position in the procedure as described above.
6) If still out of the specified position, repeat the steps 1) to 4) above till properly adjusted.

7) After completing the adjustment, apply an appropriate amount of the screw lock (1401B of THREE BOND) to the screw ①.

Notes:

1. When applying the screw locking agent, take due care not to let it stick to other parts (especially when it threads).
2. Tighten the screw with the torque of 0.4 ± 0.02 kg·cm.
3. Be sure to check the position while running the tape.
4. Removing the cassette control ass'y makes the positional adjustment easier (If you do so, remove it while referring to 7-5-1. "Removal and Reinstallation of the Cassette Control Ass'y")

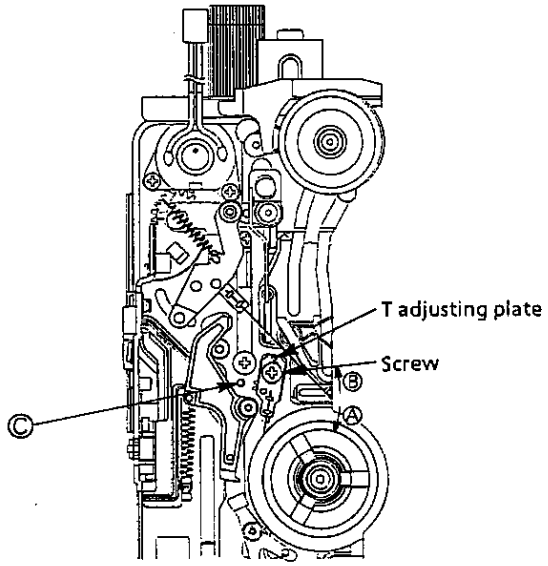


Figure 7-4-4(c).

7-4-5. CHECKING THE TAKE-UP TORQUE FOR VIDEO SEARCH REWIND (VS-REW)

1) Set the cassette torque meter (JiG8T-032) in position, then check in video search rewind (VS-REW) mode that the torque measured at the tape supply side is within the specified range.
   Standard range (in SP-mode):
   35 ± 10 g·cm with ripples of below 8 g·cm. (If the torque indicated ripples, read the torque between the ripples.)

7-4-6. CHECKING THE BACK TENSION TORQUE FOR VIDEO SEARCH REWIND (VS-REW)

1) Set the cassette torque meter (JiG8T-032) in position, then check in video search rewind (VS-REW) mode that the torque at the tape take-up side is within the specified range.
   Standard range (in SP-mode):
   13 ± 5 g·cm with ripples of below 4 g·cm. (If the torque indicated ripples, read the torque between the ripples.)

7-4-7. CHECKING THE LOADING BRAKE TORQUE

1) Referring to section 7-5-1, remove the cassette control ass'y.
2) Put the machine in standby mode.
3) Put the swing arm ass'y in such position as not to mesh with the S reel disk.
4) Place the torque gauge (45 g·cm) on the S reel disk, then check by slowly turning the torque gauge clockwise (Use 2 or 3 seconds for a single turn) that the torque measured is within the specified range.
   Specified range:
   6.5 ± 2 g·cm. (If the torque indicated ripples, read the torque between the ripples.)

Notes:

1. Be sure to set the torque gauge securely onto the reel disk. Accurate measurement cannot be expected if it is loosely set.
2. When setting the torque gauge, do not apply other force than its own weight.

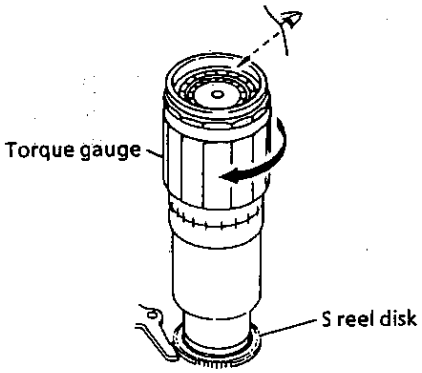


Figure 7-4-7.

7-4-8. CHECKING THE MAIN BRAKE TORQUE

1) Referring to section 7-5-1, remove the cassette control ass'y.
2) Put the mechanism in LD-STOP (Loading stop) mode.
3) For the subsequent procedures, see Steps 3) and 4) of Section 7-4-7.(The standard value differs from 40 ± 10 g·cm.)

7-4-9. CHECKING THE LOCK BRAKE TORQUE

1) Referring to section 7-5-1, remove the cassette control ass'y.
2) Put the mechanism in standby mode.
3) Release the Tu ratchet by moving it in the direction of arrow Ⓐ as shown in Fig. 6-4-9(a).
4) Set the lock brake measuring reel onto the Tu reel disk.
5) Using the dial tension gauge (JiGDT-10G), check by measuring the lock brake torque as shown by Fig. 7-4-9(b) that the torque is within the specified range. For this measurement, slowly turn the reel (2 or 3 seconds for a single turn) in clockwise direction.
   Specified range:
   $4\ ^{+2}_{-3}$ g·cm (Reading of the dial tension gauge: $4\ ^{+2}_{-3}$ g)

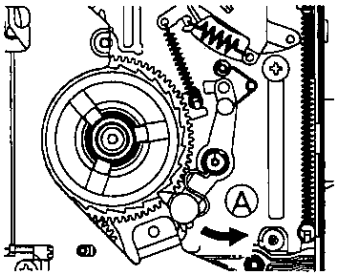


Figure 7-4-9(a)

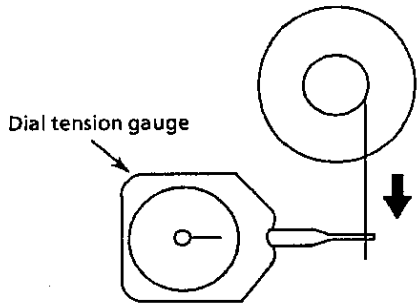


Figure 7-4-9(b).

7-4-10. CHECKING THE PINCH ROLLER PRESSURE

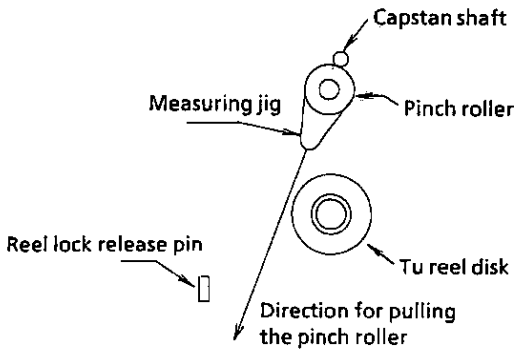


Figure 7-4-10(a).

1) Referring to Section 7-5-1, remove the cassette control ass'y.
2) Put the mechanism in LD-STOP (loading stop) mode.
3) Set the pinch roller pressure measuring jig (tape) onto the pinch roller ①.
4) Put the mechanism in playback mode, and press the pinch roller ① against the capstan shaft ②.
5) With the pinch roller pressed against the capstan shaft, turn off the power (not by turning off the power switch but by turning off the AC adaptor power).
6) Install the tension gauge (400g) to the measuring jig, and separate the pinch roller ① from the capstan shaft ② by pulling the jig in the arrow direction as shown in Fig.7-4-10(a).
7) Slowly returning the pinch roller ①, read the tension gauge when the pinch roller ① comes into contact parallel with the capstan shaft ② (See Fig. 7-4-10(b)).
   Standard range: 270 ± 30 g·f

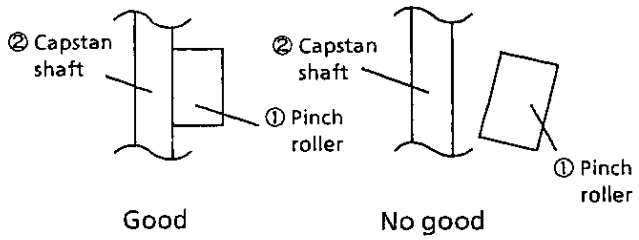


Figure 7-4-10(b).

Note:
After the measurement, cancel the playback mode without delay, and separate the pinch roller from the capstan shaft (The pinch roller will get deformed if it is left pressed against the capstan shaft for a long time duration).

7-5. MECHANICAL ASS'Y/PARTS REMOVAL, REINSTALLATION, AND REPLACEMENT

The descriptions here are related to removal, reinstallation, and replacement of the mechanical ass'y/parts for the mechanical unit.

<Cautions>
1) When the cut washer or washers are removed for parts replacement or for other reason, be sure to replace them with new ones.
2) Do not place the mechanical unit with its upside facing down on the desk or the like. If placed in such position, the mechanical parts may be deformed or damaged, possibly resulting in troubles.
3) While engaged in assembling work, do not put any screw, washer, or foreign matter among the parts of the mechanism. They will cause malfunctioning of the mechanism.
4) As the cleaning liquid, oils, grease, and screw locking agent, be sure to use the ones as specified below. Using other than those specified will result in malfunctioning of the mechanism.

Oils:	1) COSMO Hydro HV22 of COSMO Petroleum 2) COSMO Hydro HV100 of COSMO Petroleum
Grease:	MORYCOAT X5-6020 of Dow Coaning
Screw Locking Agent:	1401B of Three Bond
Cleaning fluid:	Industrial-use ethyl alcohol

<Manually Operating the Mechanism>

The following describe how to operate the mechanism by using a jig (i.e. a gear type driver) when the mechanism consists of the mechanical unit alone, that is, with no PWB provided. (There is another way of manually operating it:
Operate it by applying a voltage of 3 to 4 V to the loading motor. In this case, pull the connector off the PWB.)

1) Referring to Section 7-5-6, remove the loading motor ass'y.
2) Set the end of the jig (gear type driver) in the hole Ⓐ in the main chassis, then engage the gear of the jig with the loading gear.
3) By turning the loading gear, the mode in which the mechanism is can be changed into another mode.
   <Loading gear turning direction and mechanism operation>
   - Clockwise direction: Unloading.
   - Counterclockwise direction: Loading.

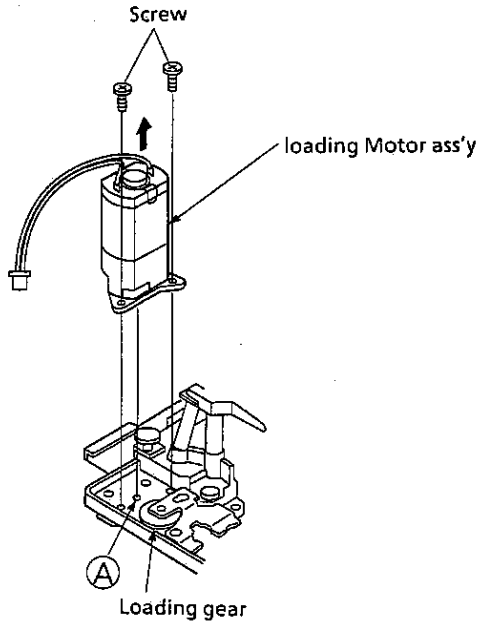


Figure 7-5(a).

<Mechanical Modes>

The following descriptions are given to outline each mechanical mode:

1) Eject mode (Cassette removing position) (Fig. 7-5(b))
   The mechanism is in this mode when the following conditions are both met: The slide chassis is in the furthest position from the drum and the eject lever is in position Ⓐ as shown in Fig. 7-5(c).
2) Standby mode (Cassette inserting position) (Fig. 7-5(b))
   The mechanism is in this mode when the eject lever is in position Ⓑ as shown in Fig. 7-5(c) (with the mechanism in the same state as the mode 1) described above excepting the eject lever.
3) Playback mode (Position for playback, recording, fast forward, rewind, etc.) (Fig. 7-5(d))
   The mechanism is in this mode when the slide chassis is in the nearest position to the drum and the tape is pulled out and running.
   i) The pinch roller is pressed against the capstan shaft (Fig. 7-5(e)).
   ii) The main brake and the Tu ratchet are both released (Fig. 7-5(f) and (g)).
4) LD-STOP (loading stop) mode (Stopping position) (Fig. 7-5(d))
   This mode is achieved when the conditions below are both met by further turning the loading gear counterclockwise, that is, in the loading direction, from the position 3) above.
   i) The pinch roller is kept completely away from the capstan shaft (Fig. 7-5(e)).
   ii) The main brake and the Tu ratchet are in contact with each other (Fig. 7-5(f) and (g)).

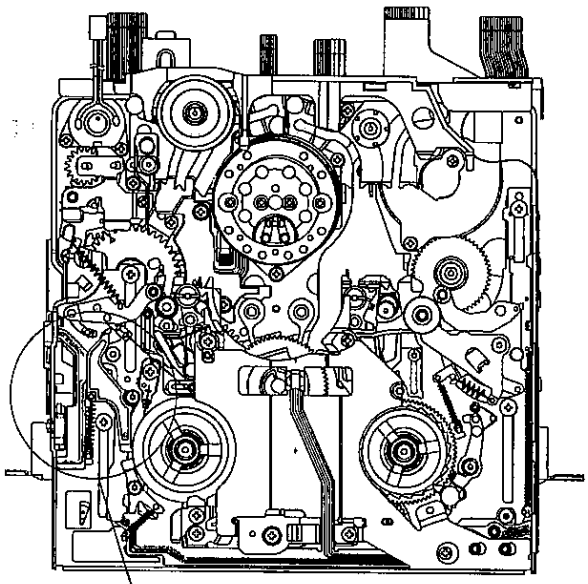


Figure 7-5(b).

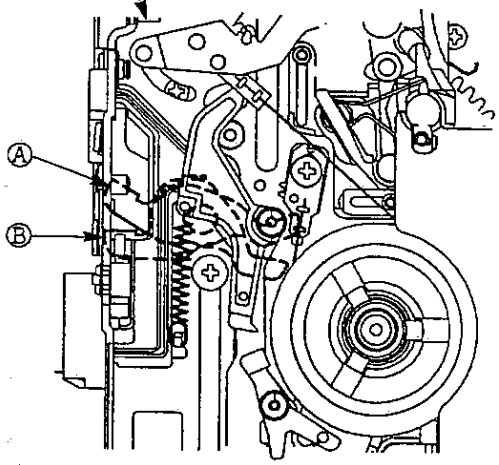


Figure 7-5(c).

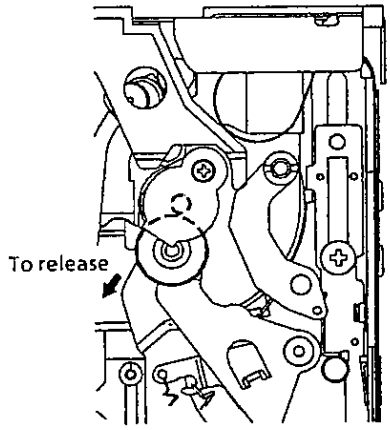


Figure 7-5(e).

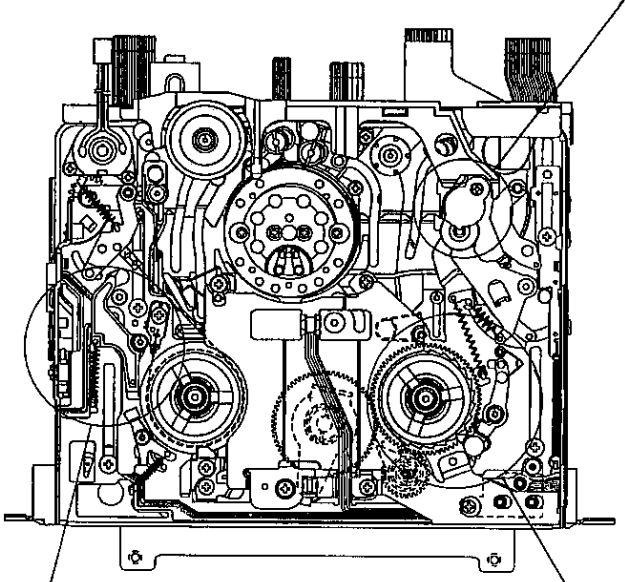


Figure 7-5(d).

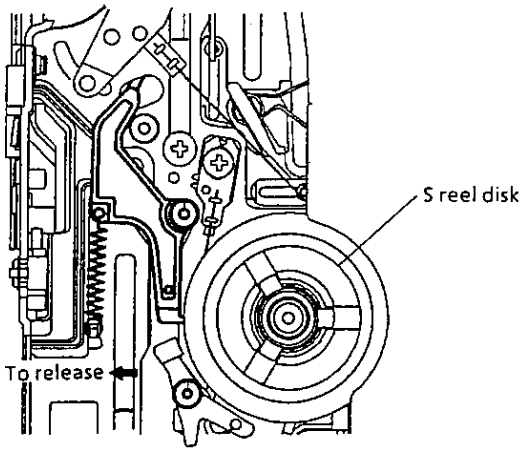


Figure 7-5(f).

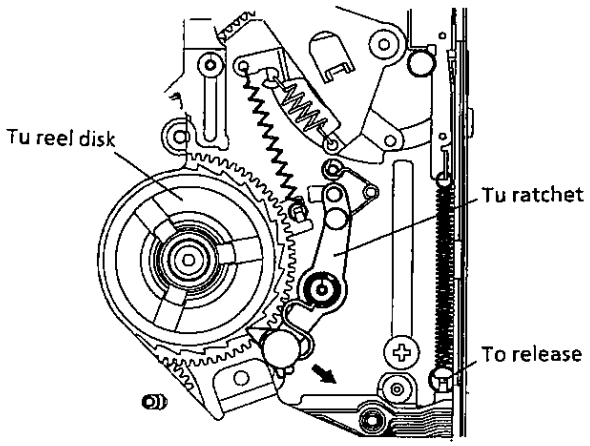


Figure 7-5(g).

7-5-1. REMOVAL AND REINSTALLATION OF CASSETTE CONTROL ASS'Y

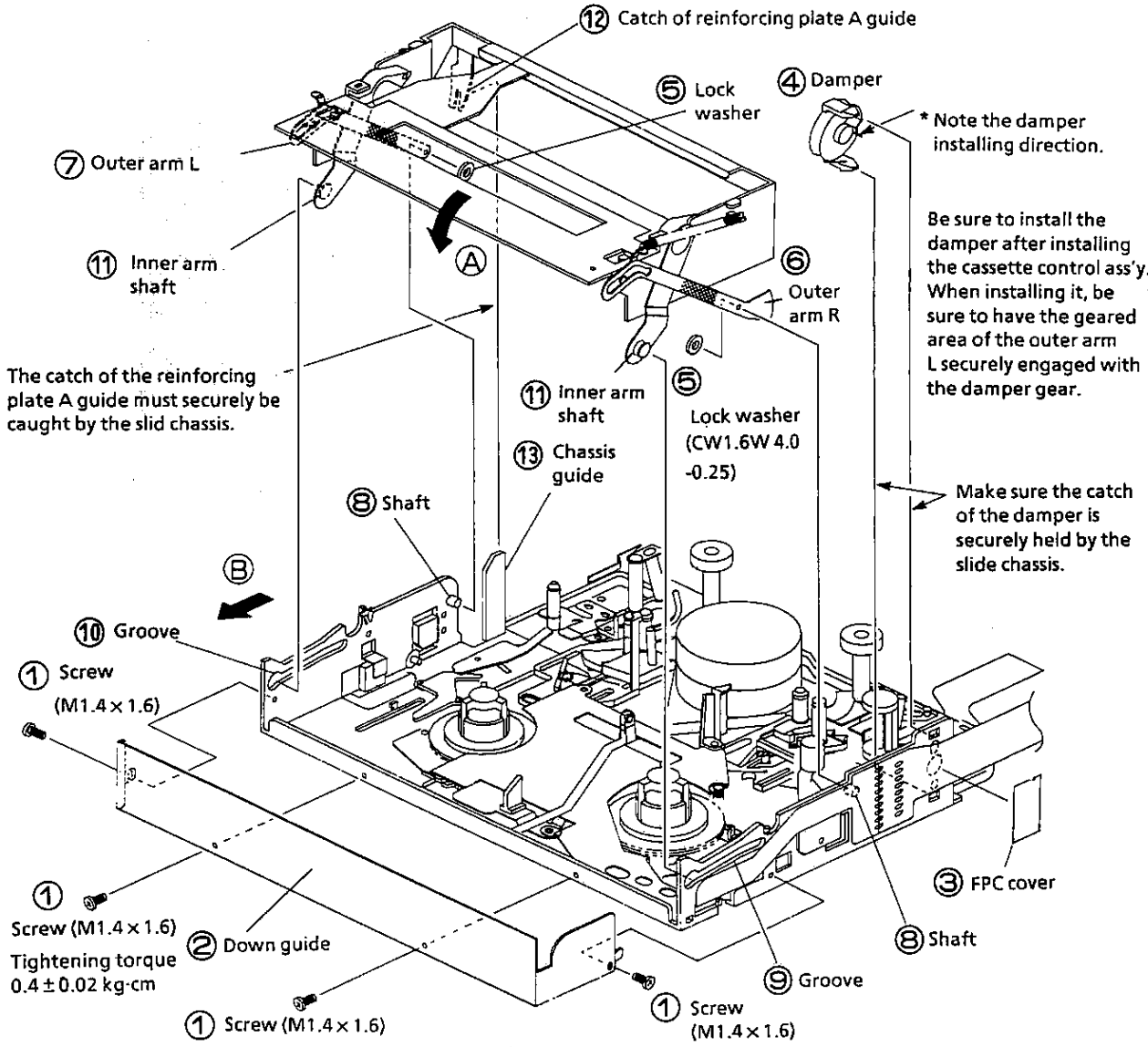

⑫ Catch of reinforcing plate A guide
⑤ Lock washer
④ Damper
* Note the damper installing direction.
⑦ Outer arm L
⑪ Inner arm shaft
Ⓐ
⑥ Outer arm R
Be sure to install the damper after installing the cassette control ass'y. When installing it, be sure to have the geared area of the outer arm L securely engaged with the damper gear.
The catch of the reinforcing plate A guide must securely be caught by the slid chassis.
⑪ Inner arm shaft
⑤ Lock washer (CW1.6W 4.0 -0.25)
⑬ Chassis guide
⑧ Shaft
Make sure the catch of the damper is securely held by the slide chassis.
Ⓑ
⑩ Groove
① Screw (M1.4 × 1.6)
① Screw (M1.4 × 1.6)
Tightening torque 0.4 ± 0.02 kg·cm
② Down guide
① Screw (M1.4 × 1.6)
③ FPC cover
⑧ Shaft
⑨ Groove
① Screw (M1.4 × 1.6)

Figure 7-5-1(a).

• Removal

1) Set the mechanical unit in standby mode and put the cassette control ass'y in eject position.
2) Remove the four screws ①, and remove the down guide ②.
3) Strip the FPC cover ③ by using a pair of tweezers or by other appropriate means, then remove the damper ④ by pressing its catches in the arrow directions as shown by Fig 6-5-1(b).
4) Remove the two lock washers ⑤, then remove the outer arms R ⑥ and L ⑦ from the shaft ⑧ by pressing them inward at the shaded positions respectively (Take due care not to press them harder than necessary lest they be deformed).
5) Turn the cassette control in the direction of arrow Ⓐ, then slide it in the direction of arrow Ⓑ.
6) Remove the inner arm shaft ⑪ from the slide chassis grooves ⑨ and ⑩ by sliding it in the direction of arrow Ⓒ as shown by Fig. 7-5-1(c). (Exercise due care not to deform the arm excessively.)

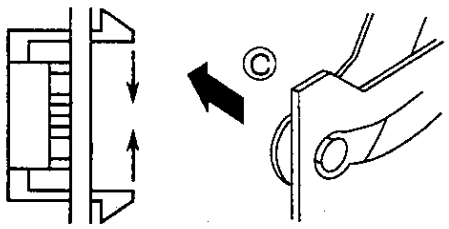


Figure 7-5-1(b). Figur 7-5-1(c).

• Reinstallation

1) Set the mechanism in standby mode.
2) Install the inner arm shaft ⑪ into the slide chassis grooves ⑨ and ⑩. (Exercise due care not to deform the arm more than necessary.)
3) Slide the cassette control ass'y in the direction reverse to arrow Ⓑ.
4) Turn the cassette control ass'y in the direction reverse to arrow Ⓐ, and install the outer arms R ⑥ and L ⑦ on the shaft ⑧.

Note:
Be sure to check that the reinforcing plate A and the catch ⑫ of the reinforcing plate guide A are securely hooked on the chassis guide ⑬.

5) Install the lock washer ⑤ (CW 1.6W4.0-0.25) on the shaft ⑧.
Note:
Do not reuse the lock washer.

6) Install the damper ④.
Notes:
1. Note the damper installing direction (See Fig. 7-5-1(d)), and check that the claws Ⓓ and Ⓔ of the damper are securely caught by the chassis.
2. When installing the damper, make sure that the geared area of the outer arm R ⑥ is securely engaged with the damper gear. (Make it sure by checking that damper is working when the cassette control ass'y is pressed down).

7) After placing the FPC cover ③ using a pair of tweezers or the like (See Fig. 7-5-1(d)), closely attach it entirely by pressing on it. While pressing the cover, take care not to deform the slide chassis by giving a pressing force in the reverse direction such as pressing the damper.
Notes:
1. After attaching the FPC cover, make sure it is closely sticking all over.
2. Be sure to attach the FPC cover, as shown in Fig. 7-5-1(d), in such position that the FPC cover is located just between the claws of the damper and also that it does not jut out of the edge of the chassis.

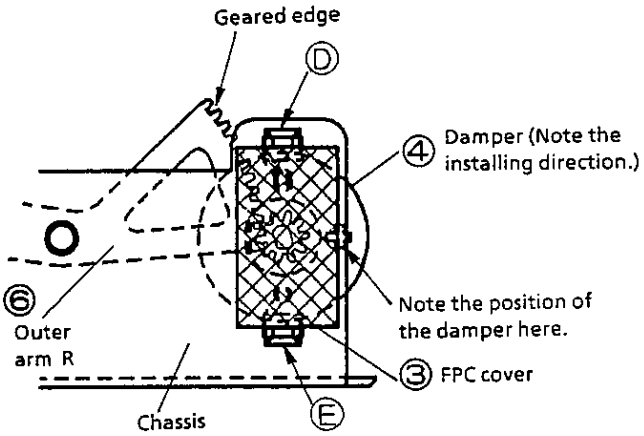


Figure 7-5-1(d).

3. Make sure that the damper does not get out of position.
4. Be sure to use a new FPC cover.

8) Install the down guide ② on the chassis, and secure it by the four screws ①.
Notes:
1. When the cassette control ass'y is up, the end of the tape protector should be located at such position as shown by Fig. 7-5-1(e).

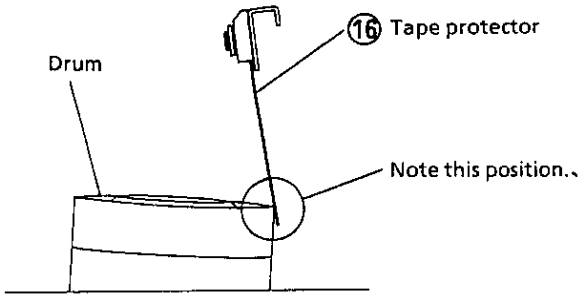
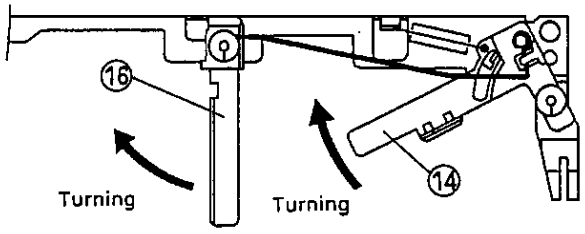
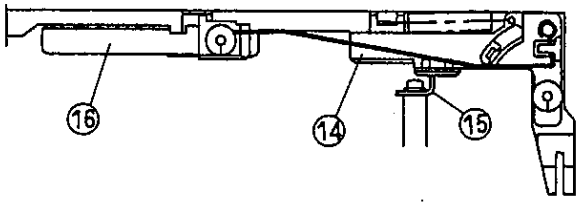


Figure 7-5-1(e).

2. After completing the cassette control ass'y installation, make sure these points: The cassette control can be smoothly mounted, the protector arm ⑭ gets in contact with the TP guide ⑮, and the protector arm ⑭ and protector ⑯ turn (See Fig. 7-5-1(f)).



When the cassette control ass'y is up:



When the cassette control ass'y is down:

Figure 7-5-1(f).

• How to eject the cassette control ass'y
Eject the cassette control ass'y by turning the spring holding portion of the lock lever in the arrow Ⓕ direction.
Note:
Exercise care not to deform the spring hooked on the lock lever.

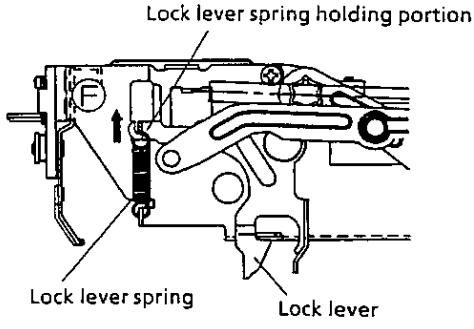


Figure 7-5-1(g).

7-5-2. REMOVAL AND REINSTALLATION OF LED HOLDING ANGLE

• **Removal**

1) Referring to Section 7-5-1, remove the cassette control ass'y.
2) Turning the LED ① in the direction of arrow A, as shown by Fig. 7-5-2(a), remove the LED ① in the arrow B direction.
3) Remove the screws ② thru④ .
4) Remove the PB protector ⑥.
5) After sliding the LED holding angle ⑦ in the direction of arrow C, as shown in Fig. 7-5-2(d), remove it by pulling it up.

Note:
Exercise due care when working with the LED holding section because it is apt to deform.

• **Reinstallation**

1) Put the mechanism in standby (eject) mode.
2) Hold up the LED ①, then insert the LED holding angle ⑦ beneath the FPC ⑧.
3) Slide the LED holding angle ⑦ so that its edges ⓐ, ⓑ, and ⓒ respectively come into the upper groove of the SR-R spring ⑨, beneath the reel lock release angle ⑩, and in the square hole made in the side of the slide chassis ⑪(See Fig. 7-5-2(d)).
4) Install the screws ② and ③ in that order.
5) Put the positioning pin ⓓ of the PB protector ⑥, then fix it by tightening the screw ④.
6) As shown by Fig. 7-5-2(b), Install the LED by putting it in the arrow-D direction and then turning it in the arrow-E direction.
   The edge of the FPC should be rounded downward and be inside the angle as shown in Fig. 7-5-2(c).
7) Referring to Section 7-5-1, install the cassette control ass'y.

Notes:
1. After installing the LED holding angle ⑦, make sure that the LED ① stands vertical.
2. Since the number of screw types handled here is 3, do not take a wrong one when installing.

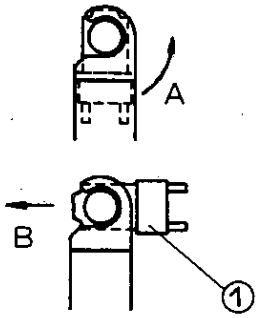


Figure 7-5-2(a).

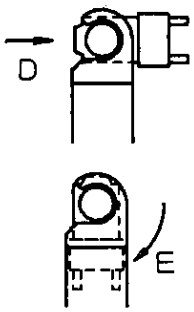


Figure 7-5-2(b).

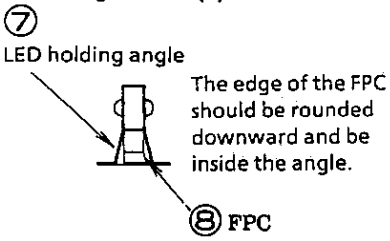


Figure 7-5-2(c).

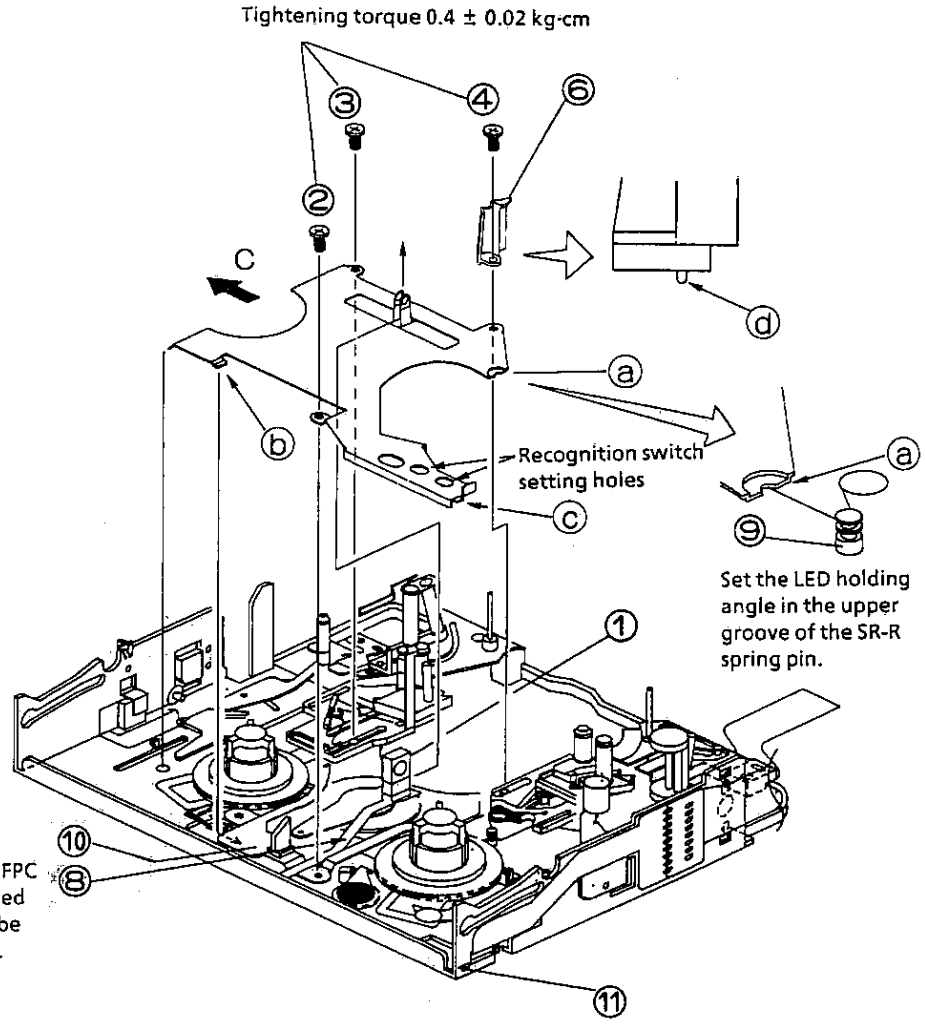


Figure 7-5-2(d).

7-5-3. REMOVAL AND REINSTALLATION OF REEL LOCK RELEASE ANGLE

• Removal

1) Referring to Section 7-5-1, remove the cassette control ass'y.
2) Referring to Section 7-5-2, remove the LED holding angle.
3) Remove the screw ①.
4) While holding the LED upward, remove the reel lock release angle ②.

• Reinstallation

1) Put the mechanism in standby mode.
2) While exercising care not to hold the FPC between, install the reel lock release angle ② by aligning the positioning hole of the angle ②,with the protrüding part Ⓐ of the slide chassis.
3) After making sure the claws Ⓑ of the angle ② are in the round holes of the chassis, install and tighten the screw ①.
4) By referring to Section 7-5-2, install the LED holding angle.
5) By referring to Section 7-5-1, install the cassette control ass'y.

Note:
When installing the reel lock release angle ②, exercise utmost care so as not to hit it against the following parts:

1) S reel disk ass'y
2) Tu reel disk ass'y
3) Swing gear
4) Tension wire

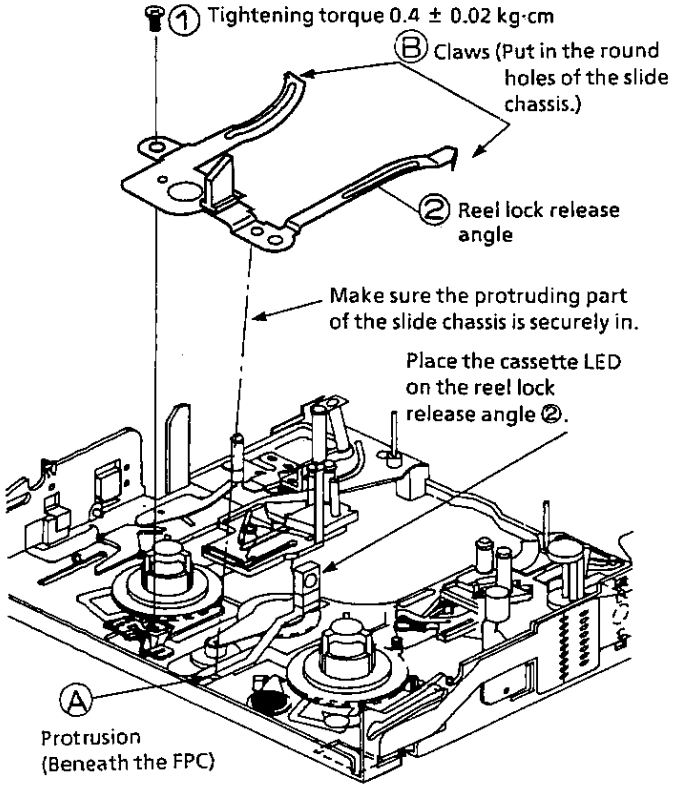

① Tightening torque 0.4 ± 0.02 kg·cm
Ⓑ Claws (Put in the round holes of the slide chassis.)
② Reel lock release angle
Make sure the protruding part of the slide chassis is securely in.
Place the cassette LED on the reel lock release angle ②.
Ⓐ
Protrusion (Beneath the FPC)

Figure 7-5-3.

7-5-4. REMOVAL AND REINSTALLATION OF S REEL DISK ASS'Y

• Removal

1) By referring to Section 7-5-1, remove the cassette control ass'y.
2) By referring to Section 7-5-2, remove the LED holding angle.
3) Remove screw ⑧ and reel stopper ⑦.
4) Remove the screw ①, then remove the tension adjusting plate ②.
5) Separate the main brake ③ from the S reel disk ass'y ④ by turning it in the direction Ⓐ. Put the tension wire ⑥ through the so made gap, then remove the S reel disk ass'y.

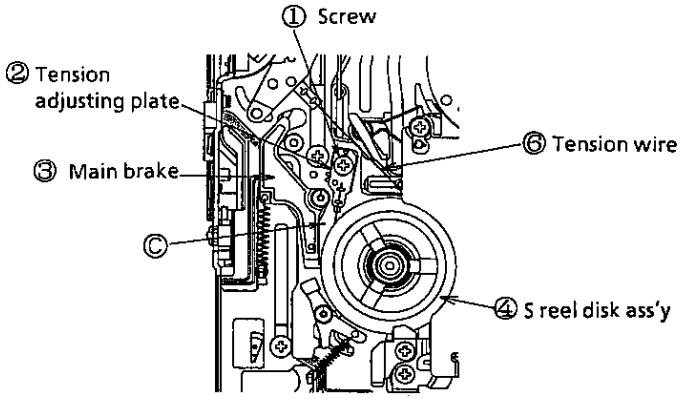


Figure 7-5-4(a).

Notes:

1. When removing and reinstalling the S reel disk ass'y, do not hold other than its knob.
2. Do not handle the tension wire with bare hand. Also, exercise caution not to let grease or other foreign matter stick to the wire.
3. Due care should be exercised so as not to give the tension wire a deformation or other damage.

• Reinstallation

1) Put the mechanism in standby mode.
2) Put the S reel disk ass'y ④ in the position with the shaft ⑤ inserted in the ass'y (till the S reel disk contacts the main brake and stops).
   Note:
   If the shaft does not easily go into the reel disk ass'y, give the ass'y a proper amount of force.
3) Move the main brake ③ in the direction Ⓐ, then press down the S reel disk ass'y ④ till it covers the root of the shaft. Make sure that, with the S reel disk ass'y ④ kept in that position, it turns without a hitch.
4) Install the tension adjusting plate ②, and secure it by the screw ① (with the tightening torque of 0.4 ± 0.02 kg·cm).
   Note:
   Set the tension adjusting plate at its center position.

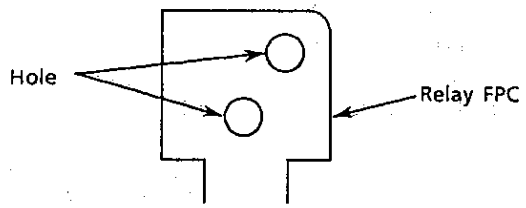


Figure 7-5-7(b).

8) After completing the installation, make sure that there is no trouble (such as a hitch of the pole base or other) in loading and unloading operations.
9) Also, make sure that there is no trouble found in tape travel (See section 7-7 "Tape Travel Adjustment").

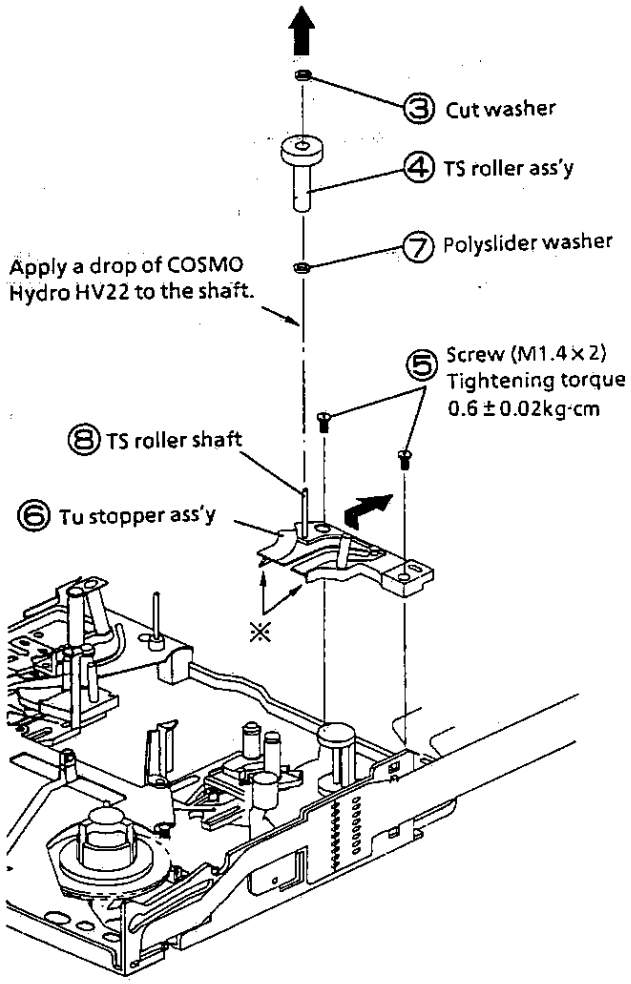

③ Cut washer
④ TS roller ass'y
⑦ Polyslider washer
Apply a drop of COSMO Hydro HV22 to the shaft.
⑤ Screw (M1.4×2) Tightening torque 0.6±0.02kg·cm
⑧ TS roller shaft
⑥ Tu stopper ass'y
※

Figure 7-5-7(c).

Figure 7-5-7(d). Not used.

Apply grease to shadowed areas (section and sliding surface) of Tu stopper ass'y.

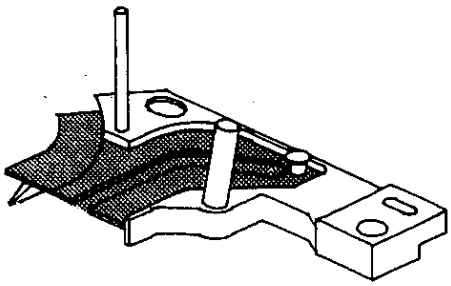


Figure 7-5-7(e).

7-5-8. REMOVAL AND REINSTALLATION OF CAPSTAN MOTOR ASS'Y

- **Removal**

1) Put the mechanism in standby mode.
2) By referring to Section 7-5-7, remove the Tu stopper ass'y.
3) Remove the screw ①. Then, disengaging the gear from the gear of the relay gear ass'y ③, remove the capstan motor ass'y ② in the direction reverse to the arrow Ⓐ direction (while keeping it in tilted position).

- **Reinstallation**

1) Put the mechanism in standby mode.
2) As shown by Fig. 7-5-8(b), holding the capstan motor ass'y ② tilted, move it in the arrow-Ⓐ direction and engage the gear of the capstan motor ass'y ② with that of the relay gear ass'y ③. Then install it while turning it in the arrow-Ⓑ direction, and secure it by the screw ① with the torque of 0.7±0.02 kg·cm. In this installation, insert the three capstan spacer ④ and due care should be exercised not to hurt the gears.
3) Make sure that the gear of the capstan motor ass'y ② is properly engaging with that of the relay gear ass'y ③ (See Fig. 7-5-8(c)).
4) Referring to Section 7-5-7, install the Tu stopper ass'y.

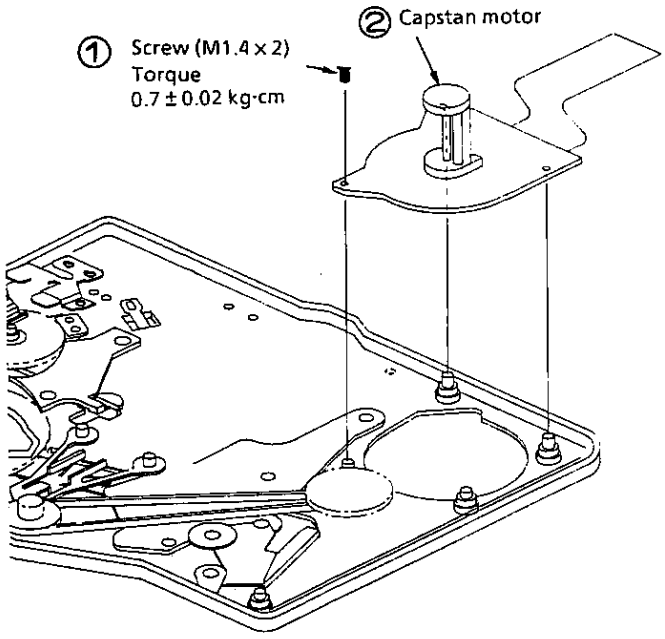


Figure 7-5-8(a).

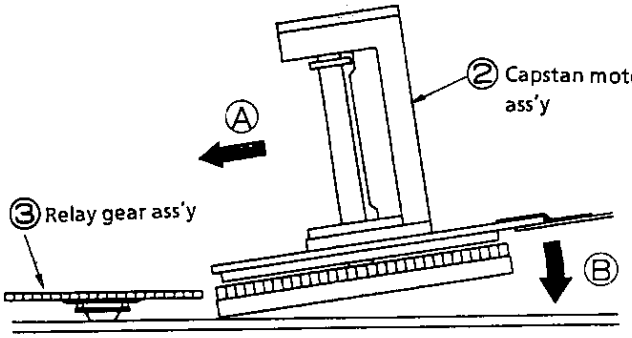
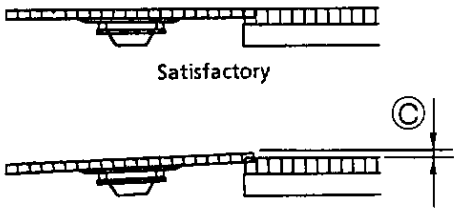


Figure 7-5-8(b).



Dimension ©: Less than 0.1 mm after giving it a turn.

Figure 7-5-8(c).

7-5-9. REMOVAL AND REINSTALLATION OF PINCH ROLLER LEVER ASS'Y

Before starting to work, remove the PWB to leave the mechanical unit alone if the machine is in VCR state.

- Removal

1) Referring to Section 7-5-1, remove the cassette control ass'y.
2) Put the mechanism in LD-STOP mode.
3) Turn the mechanism unit upside down, then remove the cut washer ② (While removing the cut washer, lightly hold the pinch roller lever ass'y ① so as not to let it fall down).

Note:
Do not put the mechanical unit upside down on the desk or the like. Some of the mechanical parts may be deformed and a trouble may result.

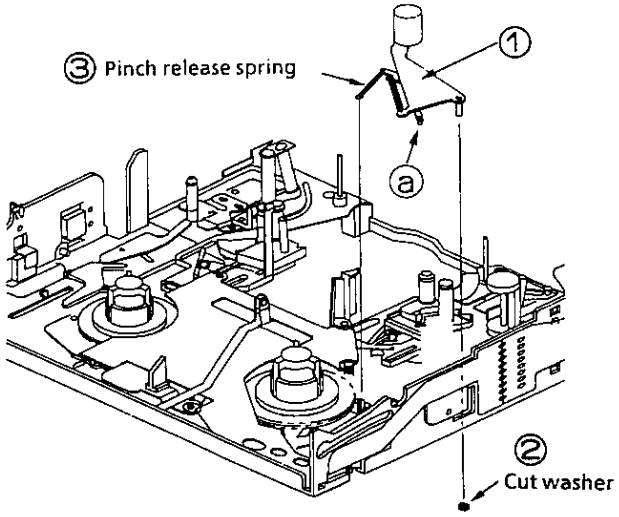


Figure 7-5-9(a).

4) Remove the pinch roller lever ass'y ① , then remove the pinch release spring ③ from the slide chassis.

Note:
If you remove the pinch release spring first, take utmost care so that the gear of the Tu reel disk ass'y be never hurt.

- Reinstallation

1) Put the mechanism in LD-STOP mode.
2) Install the pinch roller lever ass'y ①. This installation is made easier if the pinch release spring ③ is installed to the slide chassis first.

Note:
If installing the pinch release spring after the pinch roller lever ass'y, exercise utmost care so that the gear of the Tu reel disk ass'y be never hurt.

3) Insert the operating pin ⓐ of the pinch roller lever ass'y ① in the position as shown in Fig. 7-5-9(b).

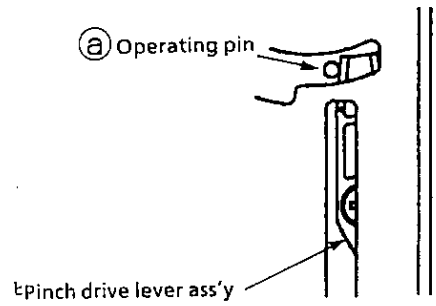


Figure 7-5-9(b).

4) Secure it by the cut washer ② on the rear side of the mechanical unit (Be sure to use a new cut washer).

Note:
Do not hurt or smear the pinch roller.

•Preparatory Assembling
By referring to Fig. 7-5-9(c), assemble the following parts:
① Pinch roller lever ass'y
③ Pinch release spring
④ Pinch double acting lever ass'y
⑤ Pinch pressure spring

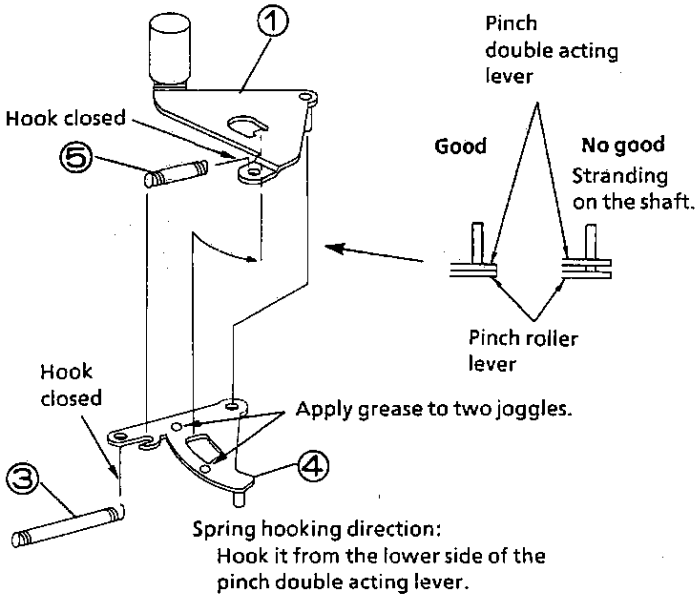


Figure 7-5-9(c).

7-5-10. REPLACEMENT OF DRUM ASS'Y

Note:
It is a must to exercise the greatest possible care when replacing the drum ass'y: Never give it even a trifle scar or other damage, and never stain the drum surface and head.

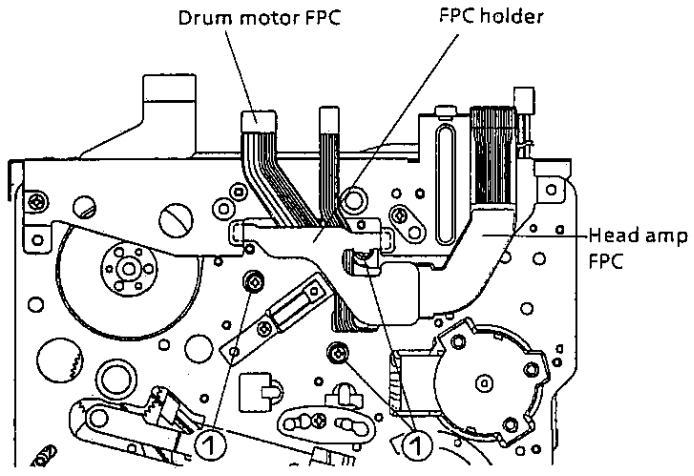


Figure 7-5-10(b).

1) Put the cassette control ass'y in eject state.
2) Remove the FPC holder.
3) Remove the three drum ass'y fixing screws ①, then remove the upper and lower drum ass'y. Be cautious not to hurt the drum.(See Fig. 7-5-10(b))
4) Install the new upper and lower drum ass'y with care taken not to give any scars, then secure them by the three drum ass'y fixing screws ①. In this installation, set the head amp FPC in hole A and the drum motor FPC in hole B (See Fig. 7-5-10(c)). The screw tightening torque is 500 ± 50 g·cm.
5) Install the FPC holder.
6) After the upper and lower drum ass'y , be sure to carry out tape travel adjustment and playback switching point adjustment.

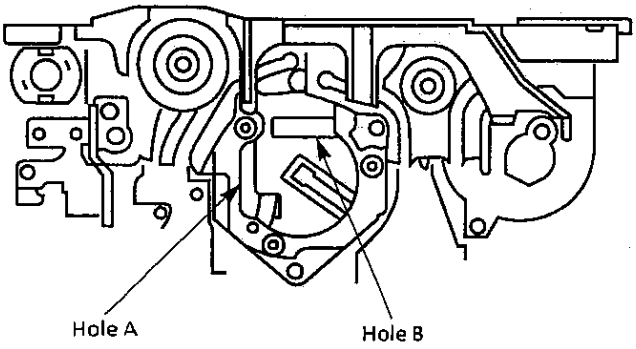


Figure 7-5-10(c).

Caution:
Below is described the mechanism assembly and parts replacement which need high technique. Therefore the mechanical service described below must be performed by the person who has taken technical training course.
If any other person must perform the mechanical service, he must read carefully the manual so as to familiarize with it and perform the service with utmost care.

7-5-11. REMOVING AND MOUNTING OF SLIDE CHASSIS

- Removal

1) Set the standby mode.
2) Referring to item 7-5-1, remove the cassette compartment ass'y.
3) Referring to item 7-5-2, remove the LED holding angle.
4) Referring to item 7-5-3, remove the real lock releasing angle.
5) Remove the washer (1), and remove the swing arm ass'y (2).
6) Remove the screw (3) (2 pcs.), and remove the SL guide angle (4).
7) Referring to item 7-5-7, remove the relay FPC retainer and relay FPC holder.
8) Load the slide chassis until the slide rail contacts the stopper (see Figure 7-5-11 (b)). (So as to prevent deviation of pole base from the slide rail when the slide chassis is removed.)

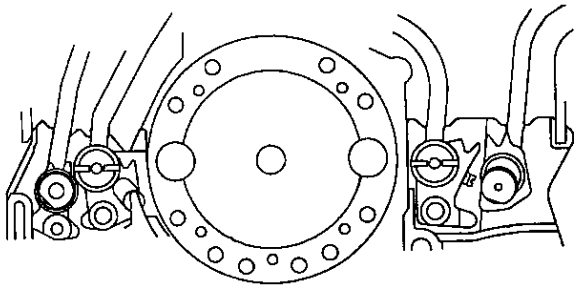


Figure 7-5-11 (a)

9) Remove the screws (5) (4 pcs.).
10) Remove the slide chassis in the arrow (A) direction.(Lift first the front side.)

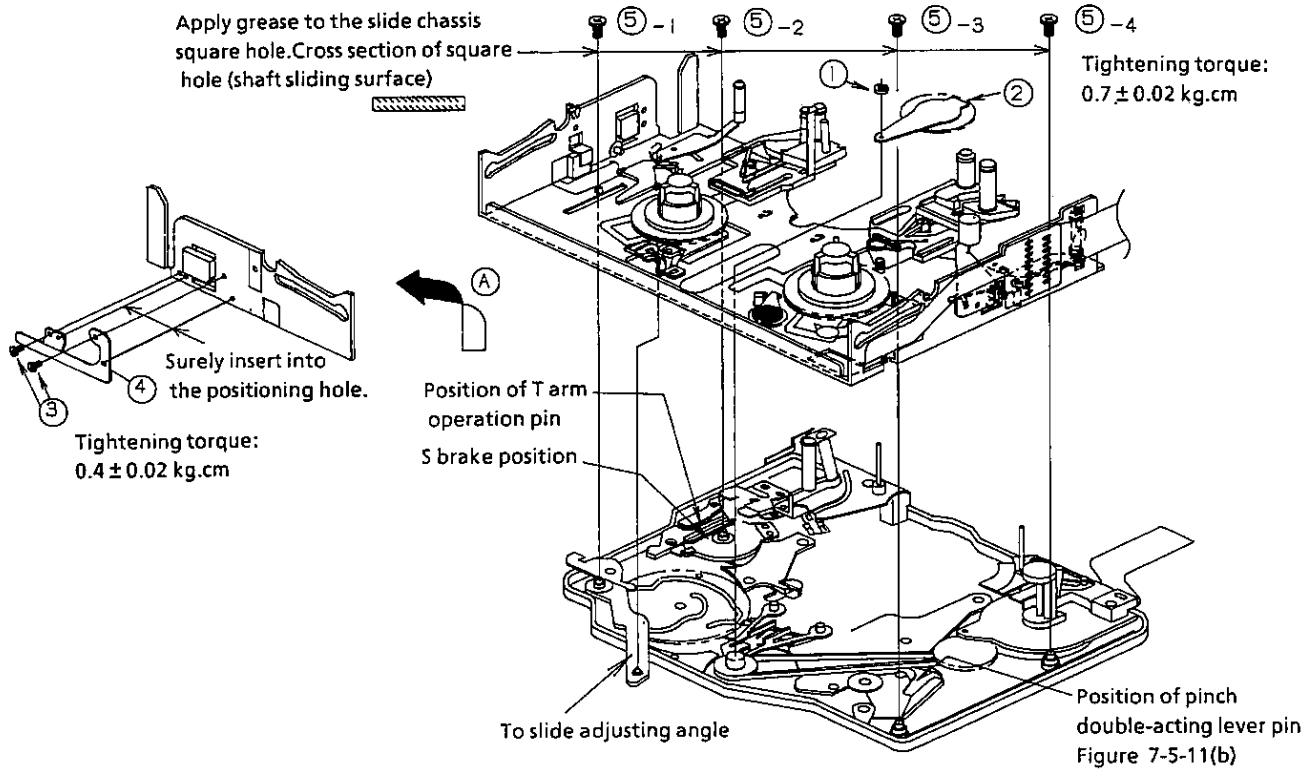


Figure 7-5-11(b)

図2-5-11(b)

● Mounting

1) Apply a proper amount of grease to the end face of arrow-marked long hole (5)-a(hatched area) of slide chassis (5) as shown in Figure 7-5-11(c).
2) Referring to item 7-5-6, remove the loading motor ass'y.

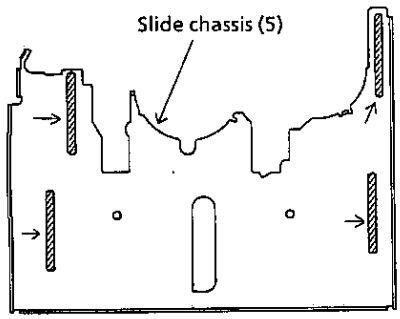


Figure 7-5-11(c)

3) Set the operation pin (6)-a of SL chassis drive lever (6) on the external periphery of main chassis (7) as shown in Figure 7-5-11(d).

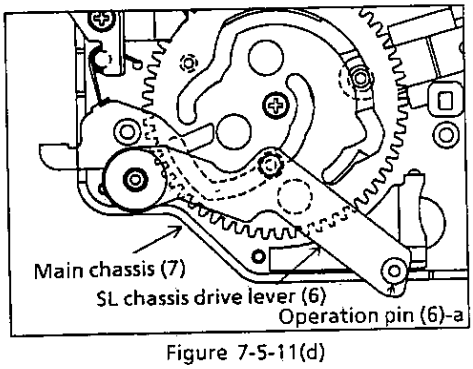


Figure 7-5-11(d)

4) Slightly lift the front part of slide chassis (so as to prevent contact with the operation pin of SL chassis drive lever), engage the front ends of slide rails L(8) and R(9) with the front ends of S topper (10) and Tu stopper (11) as shown in Figure 7-5-11(e), insert the operation pin (6)-a of SL chassis drive lever (6) into the long hole (12)-a of slide adjusting angle (12) (see Figure 7-5-11(f)), and align the long hole (5)-a of slide chassis (5) (4 places) with the shaft of main chassis. (See Figure 7-5-11(b).)

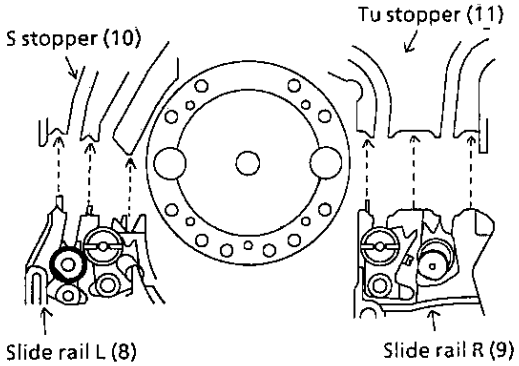


Figure 7-5-11(e)

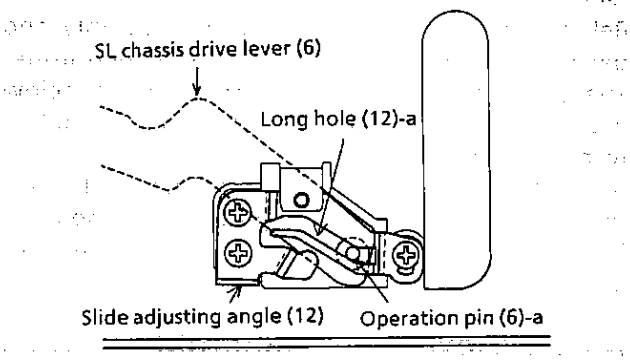


Figure 7-5-11(f)

5) Fit the 4 screws (tightening torque: 0.7 ± 0.02 kg.m).
Mount in the following procedure.
① Move the tension arm ass'y (13) in the arrow (A) direction, and insert the pin (13)-a into the groove of T arm rail (14). (See Figure 7-5-11(g).)
② Move the main brake (15) in the arrow (B) direction, and insert the pin (15)-a at the right side of T arm rail (14). (See Figure 7-5-11(g).)

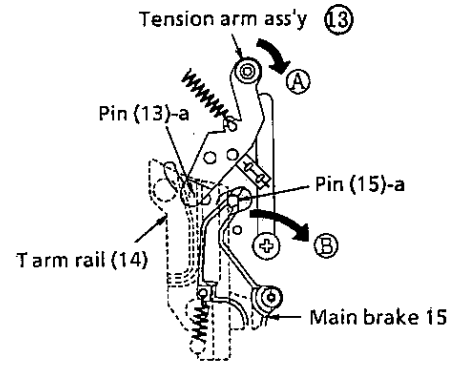


Figure 7-5-11(g)

③ Fit the screws (5)-1 and 2.
Care must be taken since the screw (5)-1 differs from other three screws (yellow)
Note:
Be careful so as not to deform the tension wire ass'y.
④ Move the pinch arm (16) in the arrow (C) direction, and insert the pin (16)-a at the left end of pinch drive lever (17). (See Figure 7-5-11(h).).

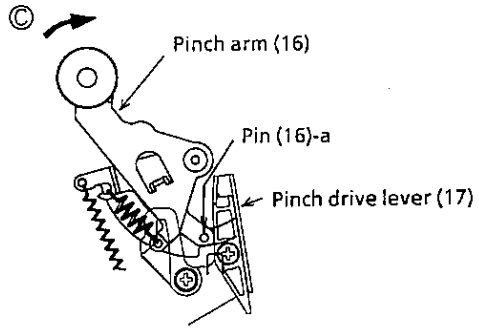


Figure 7-5-11(h)

⑤ Fit the screws (5)-3 and 4.When fitting the screw (5)-4, take care so that the Tu holding guide operating plate is not clamped by the shaft of main chassis.
⑥ Ascertain that the S loading arm (18) and T loading arm (19) are engaged with the pin (20)-a of pressure lever (20), and using the gear driver, ascertain that the loading and unloading operations are normal.

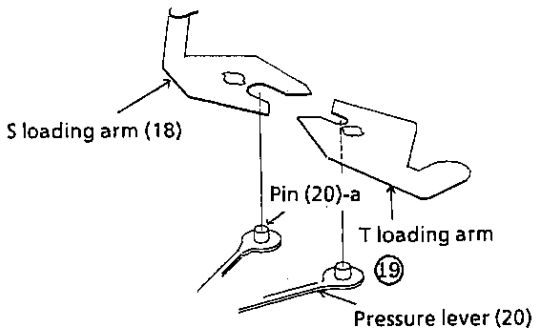


Figure 7-5-11(i)

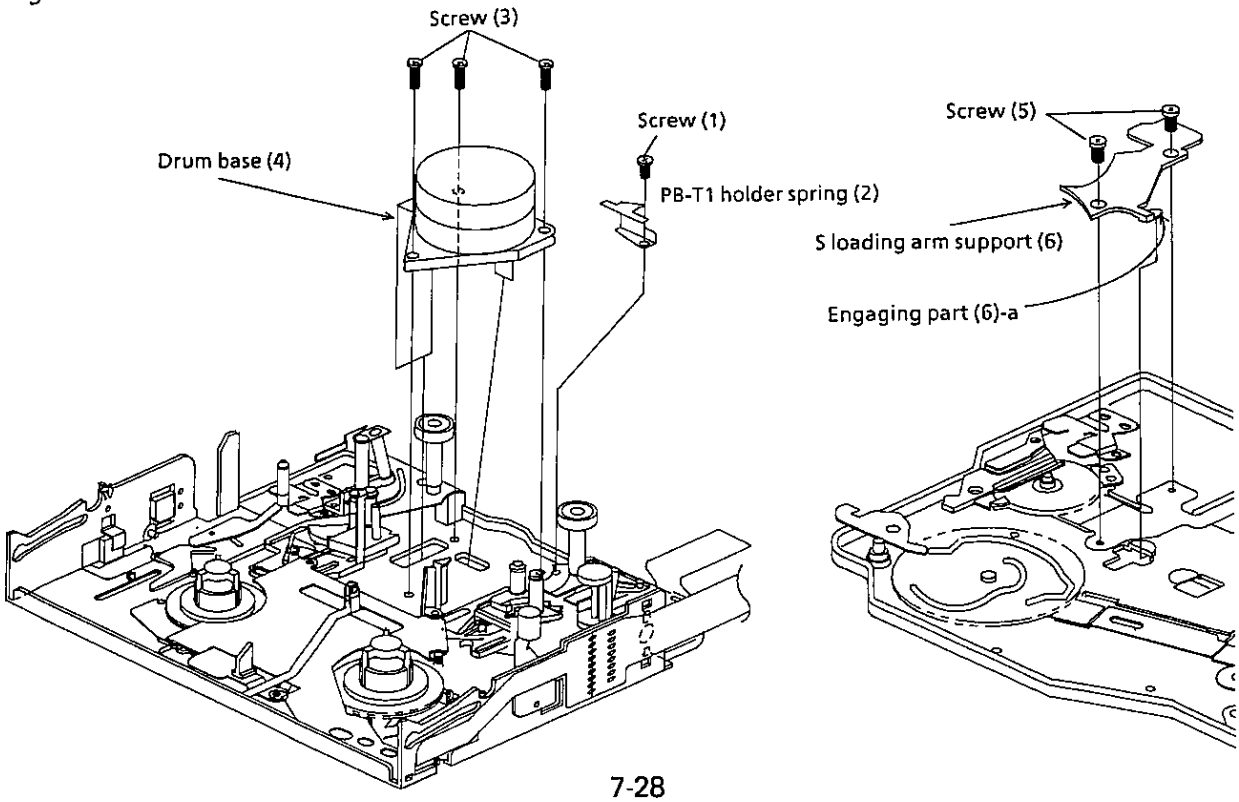
6) Referring to item 7-5-7, mount the relay FPC retainer and relay FPC holder.
7) Mount the SL guide angle (4) with two screws (3).
8) Fix the swing arm ass'y (2) with the washer (1).
9) Referring to item 7-5-6, mount the loading motor ass'y.
10) Referring to item 7-5-3, mount the reel lock releasing angle.
11) Referring to item 7-5-2, mount the LED holding angle.
12) Referring to item 7-5-1, mount the cassette compartment ass'y.
13) Referring to item 7-7, check the tape travel.

Note:
Be careful so as not to damage the drum ass'y.

7-5-12. DREMOVING AND MOUNTING OF DEW SENSOR ASS'Y

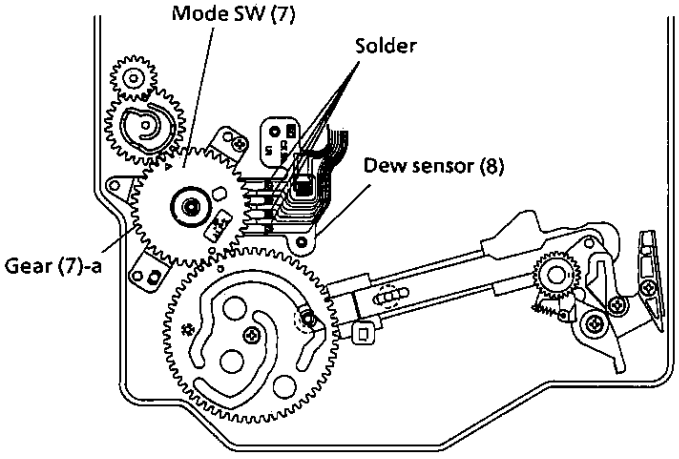
- **Removal**

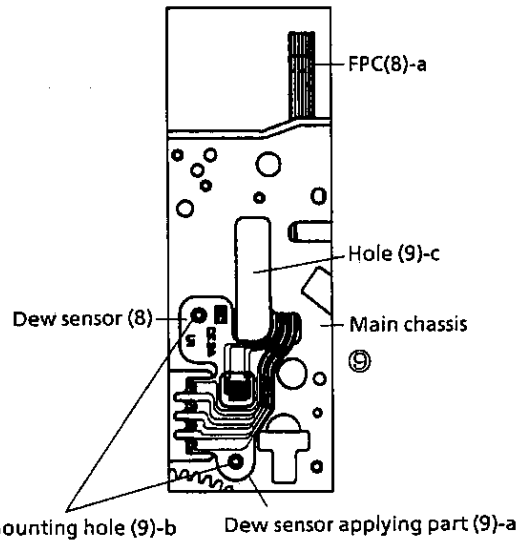
1) Referring to item 7-5-10, remove the FPC holder and head amp FPC.
2) Remove the screw (1), and remove the PB-T1 holder spring (2).
3) Remove the 3 screws (3), and remove the drum base (4).
(Take utmost care so as to prevent damage and contamination.)
4) Referring to item 7-5-11, remove the slide chassis.
5) Remove the 2 screws (5), and remove the S loading arm support (6).
6) Unsolder the dew sensor (8) to separate the mode SW (7).
When soldering or unsoldering, take care so that the gear part (7)-a of mode SW is not damaged by the soldering iron.)
7) Remove the dew sensor ass'y (8) attached to the main chassis (9) with double-coated tape. At this time take due care so that the double-coated tape does not remain on the main chassis. (If it remains, clean the attaching part (9)-a of main chassis (9) with industrial methyl alcohol.)

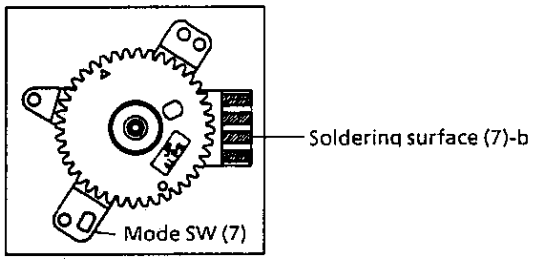


• Mounting

1) Ascertain that the soldering surface (7)-a of mode SW (7) is clean.
(If many solder remains, remove it.)
2) Clean the dew sensor attaching part (9)-a of main chassis (9) with alcohol.
3) Peel off the peeling paper at the rear side of dew sensor ass'y (8), align the S loading arm support mounting hole (9)-b (2 places) of main chassis (9) with the holes of dew sensor ass'y (8) (2 places), and apply it. After applying insert FPC(8)-a of dew sensor ass'y (8) at the rear side through the hole (9)-c of main chassis.
(When applying the dew sensor, take utmost care so as not to damage or contaminate the sensor surface. When applying, depress the periphery of dew sensor with unused swab or soft piece.)
4) Solder the mode SW (7) and dew sensor ass'y (8) (4 places).
(During soldering cover the upper part of dew sensor with paper or the like so as to prevent entry of flux. Take care so that the gear of mode SW is not damaged by the soldering iron. Be careful so that the solder does not touch the adjacent pattern.)
5) Engage the engaging part (6)-a of S loading support (6) with the main chassis (9), and tighten the 2 screws (5) (0.4 ± 0.02 kg.cm).
6) Referring to Figure 7-5-10(c), mount the drum base ass'y (4) on the main chassis (9), and tighten the 3 screws (0.8 ± 0.02 kg.cm).
7) Fix the PB-T1 holder spring (2) with the screw (1) (0.7 ± 0.02 kg.cm).
8) Apply the double-coated tape head amp FPC attached to the main chassis to fix.
9) Mount the FPC holder and head amp FPC.
10) When the drum base ass'y has been removed, be sure to check the tape travel and switching point, referring to item 7-7.



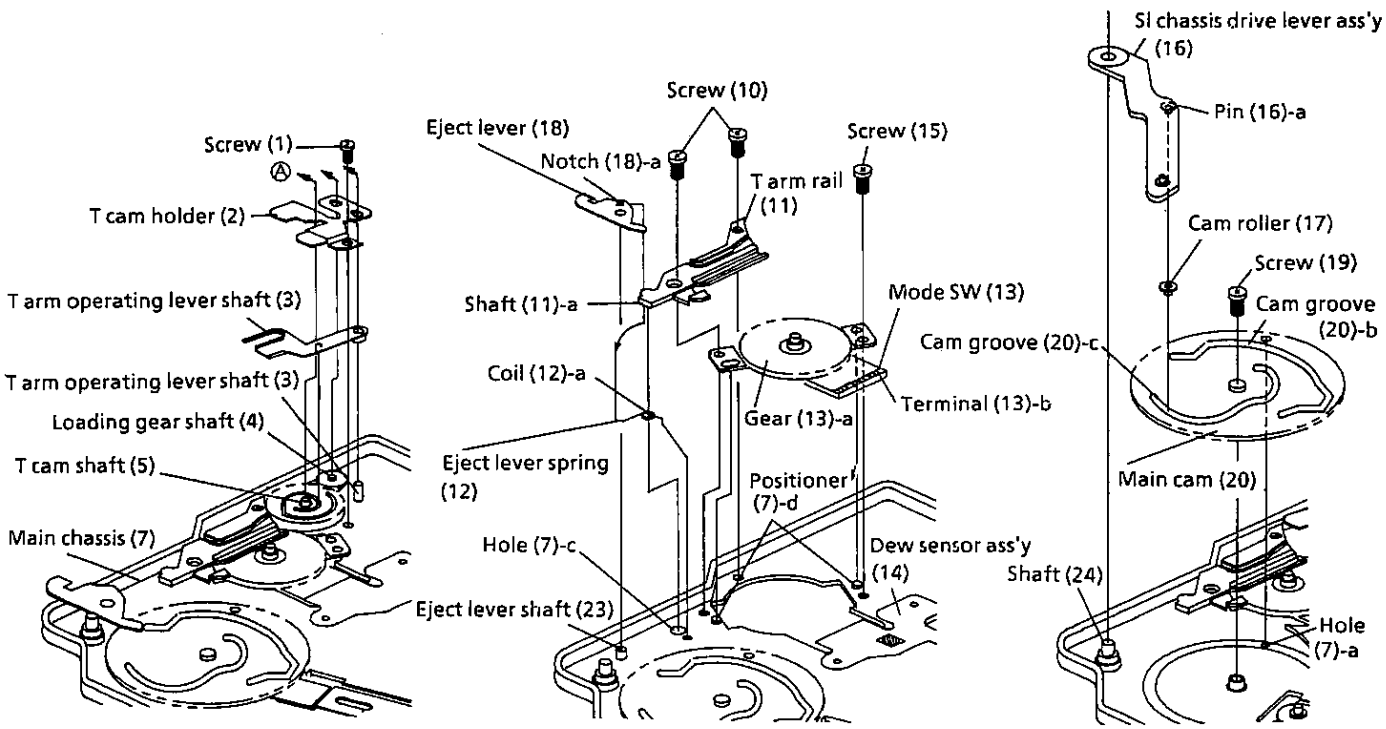




7-5-13 REMOVING AND MOUNTING OF MODE SW

• Removal

1) Referring to item 7-5-11, remove the slide chassis.
2) Remove the screw (1), move the T cam holder (2) in the arrow (A) direction, and remove it. (Release the engaging part from the groove of loading gear shaft (4), T arm operating lever shaft (3), and T cam shaft (5).)
3) Remove the T arm operating lever (6).
4) Referring to item 7-5-12, remove the two screws, and remove the S loading arm support. (Take due care since the S loading arm support has a part to be engaged with the main chassis.)
5) Remove the two screws (10), and remove the T arm rail (11). The shaft (11)-a of T arm rail (11) serves as a guide of coil part (12)-a of eject lever spring (12). When removing, be careful so that the eject lever spring (12) is not lost.
6) Unsolder the mode SW (13) and dew sensor ass'y (14) to separate them. (When unsoldering, take due care so that the gear (13)-a of mode SW (13) is not damaged by the soldering iron. The performance of dew sensor (14) is impaired by contamination. Therefore, when soldering or unsoldering, cover the dew sensor (14) with paper so as to protect it from flux.)
7) Remove the screw (15), and remove the mode SW (13).
8) Remove the SL chassis drive lever ass'y (16) carefully so that the cam roller (17) is not lost.
9) Remove the eject lever (18) and eject lever spring (12).
10) Remove the screw (19), and remove the main cam (20).



- Mounting and phase setting

1) Mount the mode SW (13), aligning with the chassis positioner (two places) (7)-d, and tighten the one screw (15) (0.7 ± 0.02 kg.cm). (When the mode switch is mounted, the dew sensor ass'y must be above the mode SW.)
2) Cover the upper part of dew sensor (14) with paper (do not use adhesive paper), and solder the 4 places of terminal (13)-b of mode SW (13) with due care so that the gear (13)-a of mode SW (13) is not damaged by the soldering iron. At this time take care so that the solder does not contact other adjacent pattern.
3) Arrange the marking (13)-c of gear of mode switch (13) so that it matches with the hole (7)-a of main chassis. (See Figure 7-5-13(a).)

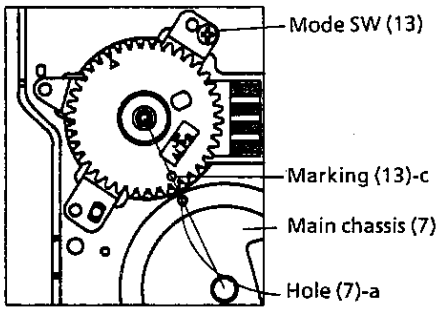


Figure 7-5-13(a)

4) Arrange the hole (20)-a of main cam (20) so that it matches with the hole (7)-a of main chassis, and tighten the screw (19) (0.7 ± 0.02 kg.cm).
At this time ascertain that the pinch cam roller shaft (22) of pinch drive lever ass'y (21) has been inserted into the cam groove (20)-b.(See Figure 7-5-13(b),(c).)

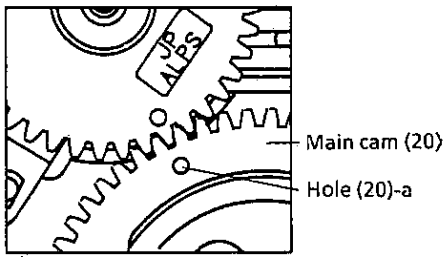


Figure 7-5-13(b)

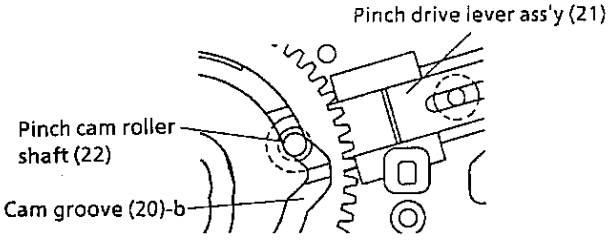


Figure 7-5-13(c)

5) Align the matchmark of T cam (8) with the matchmark of mode SW (13) to mount. (See Figure 7-5-13(d).)

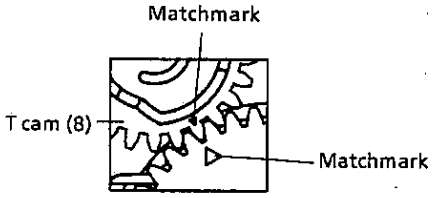


Figure 7-5-13(d)

6) Fit the T arm operating lever ass'y (6) to the shaft (3), and insert the pin (6)-a into the groove of T cam (8). (See Figure 7-5-13(e).)
7) Fit the Loading gear ass'y (9) to the shaft (4). (See Figure 7-5-13(d).)

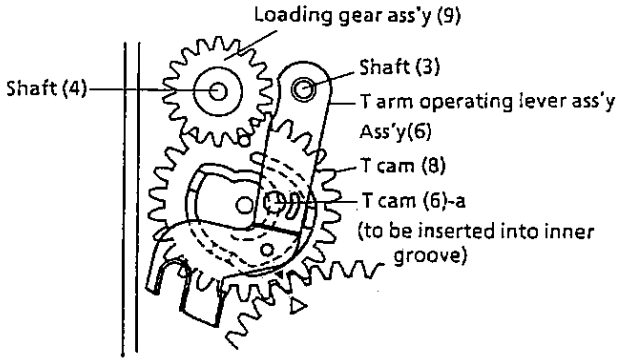


Figure 7-5-13(e)

8) Arrange the T cam holder (2) in the specified position, sidle it in the arrow direction, and tighten the screw (0.7 ± 0.02 kg.cm).(See Figure 7-5-13(f).)

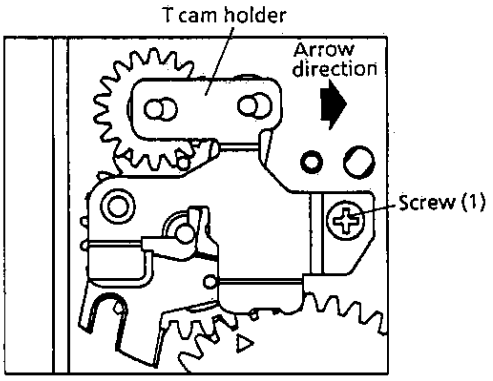


Figure 7-5-13(f)

9) Insert the one end of eject lever spring (12) into the hole (7)-b of chassis, then passing the shaft (11)-a of T arm rail (11) through the coil (12)-a of spring (12), fit it in the main chassis hole (7)-c, and tighten the two screws (10) (0.4 ± 0.02 kg.cm). (See Figure 7-5-13(g).)

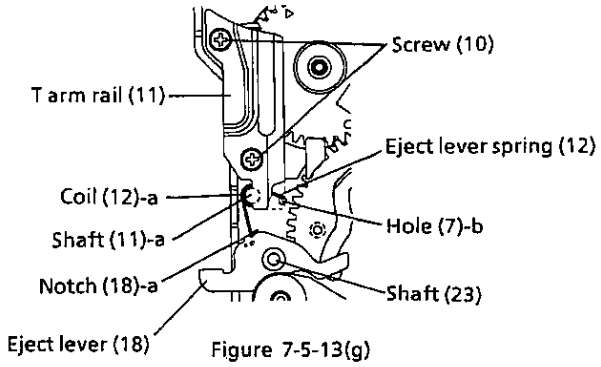


Figure 7-5-13(g)

10) Engage the end of eject lever spring (12) with the notch (18)-a of eject lever (18), and mount it on the shaft (23).
11) Mount the cam roller (17) on the pin part (16)-a of SI chassis drive lever ass'y (16), mount the cam roller (17) in the cam groove (20)-c of main cam (20), and mount the SL chassis drive lever ass'y (16) on the shaft (24).
12) Referring to item 7-5-11, mount the slide chassis.

7-5-14 Parts which need utmost care when mounting

7-5-14-1 Pole base S1 ass'y

1) Insert the slide rail L between the pole base and the PBS1 slider as shown in Figure 7-5-14-1.

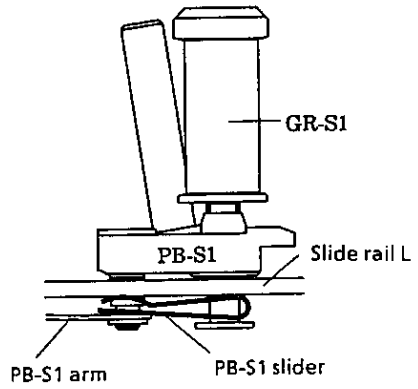


Figure 7-5-14-1

7-5-14-2 Tension wire ass'y

1) Carefully discriminating the front and rear sides of tension wire, mount it as shown in Figure 7-5-14-2.

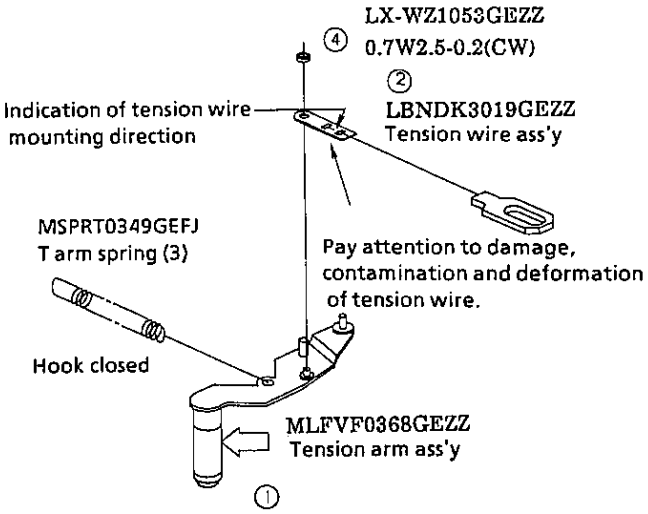


Figure 7-5-14-2

2) When mounting the tension wire on the slide chassis, take care so that it is not twisted.

7-5-14-3. Tu guide arm spring

1) Fit the center of Tu guide arm spring to the shaft of Tu guide arm as shown in Figure 7-5-14-3, and engage its both ends with the slide chassis and Tu guide operation pin.
2) Engagement of Tu guide operation pin must be as shown in Figure 7-5-14-3.

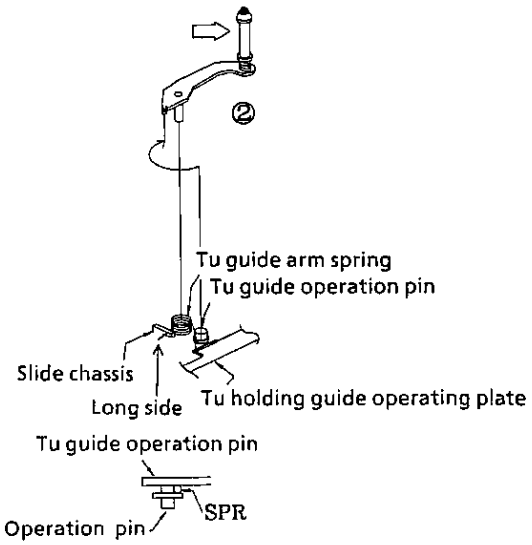


Figure 7-5-14-3

7-6. MEASURE TO TAKE IN CASE OF DISABLED EJECTION

1) Install the battery again after once removing it or connect the AC adaptor again after once disconnecting it, then reset the system controller to its initial state.
2) Turn on the power, and push down the EJECT button.
3) If the cassette control ass'y is not ejected even by taking the above steps, take the following:
   ① Take out the mechanical unit alone by disassembling the VCR set.
   ② Operate the mechanism by referring to "< Manually Operating the Mechanism >" described in Section 7-5.

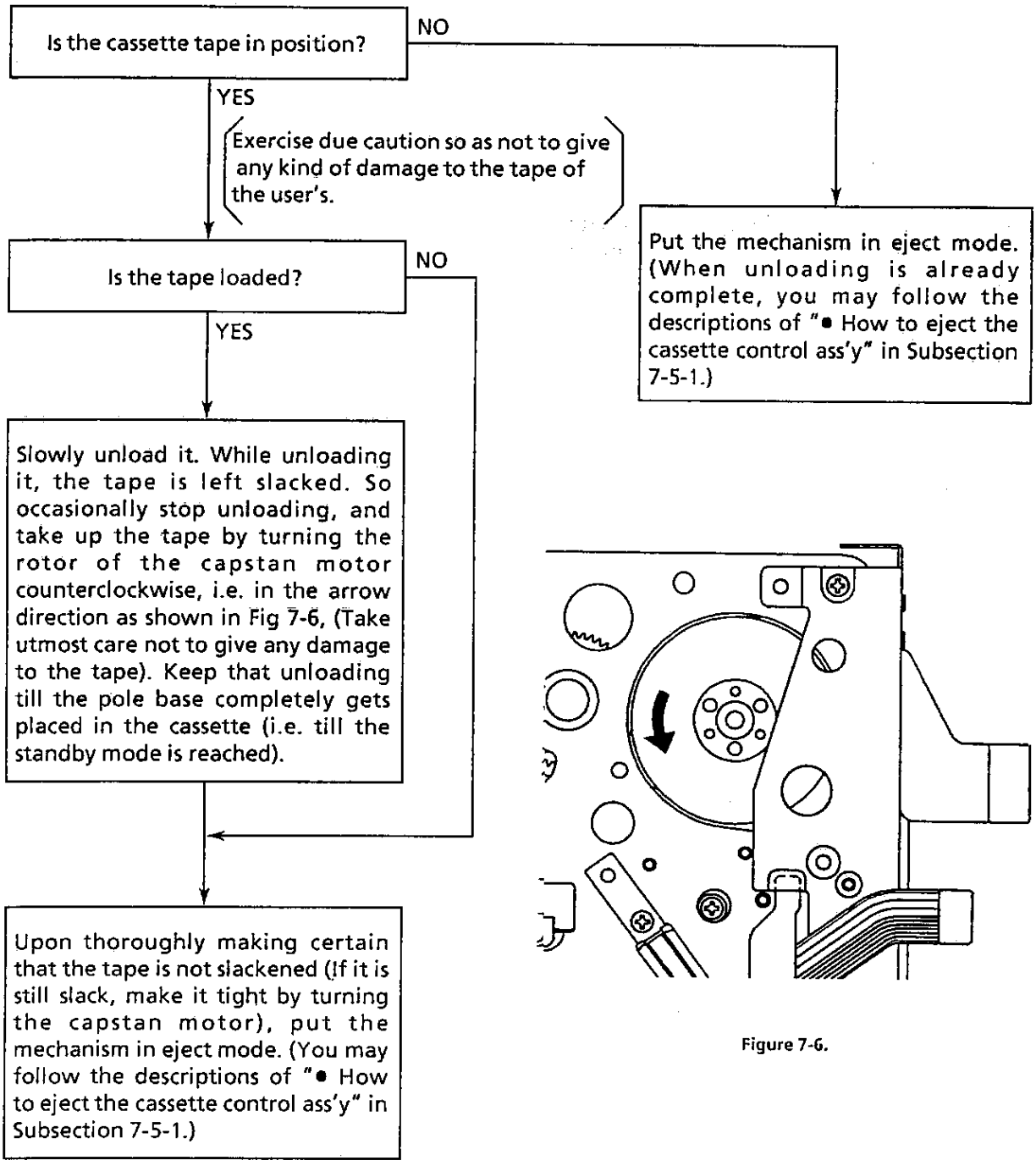

Is the cassette tape in position?
NO
YES
Exercise due caution so as not to give any kind of damage to the tape of the user's.
Put the mechanism in eject mode. (When unloading is already complete, you may follow the descriptions of "• How to eject the cassette control ass'y" in Subsection 7-5-1.)
Is the tape loaded?
NO
YES
Slowly unload it. While unloading it, the tape is left slacked. So occasionally stop unloading, and take up the tape by turning the rotor of the capstan motor counterclockwise, i.e. in the arrow direction as shown in Fig 7-6, (Take utmost care not to give any damage to the tape). Keep that unloading till the pole base completely gets placed in the cassette (i.e. till the standby mode is reached).
Upon thoroughly making certain that the tape is not slackened (If it is still slack, make it tight by turning the capstan motor), put the mechanism in eject mode. (You may follow the descriptions of "• How to eject the cassette control ass'y" in Subsection 7-5-1.)

Figure 7-6.

7-7. TAPE TRAVEL ADJUSTMENT

The 8-mm VCR uses the ATF (an acronym of Automatic Track Finding) System which controls the tape travel speed according to the signals (four types) recorded on the tape.
This system, having made unnecessary the tracking adjusting controls needed by the VHS system VCRs, automatically performs tracking operation. The tape travel adjustment here, therefore, uses a jig (Track shift jig. See Note ①) which shifts the tracking by the fixed amount (about 1/4) from the just tracking by forcing the ATF to operate.

Note ①
The track shift jig is used to connect a 4.9 kΩ resistor between Pins No. 11 and No. 2 of the test connector P35 of the VCR main PWB.

7-7-1. PRE-ADJUSTMENT PREPARATIONS AND TRAVEL SYSTEM CHECKING ADJUSTMENT

1) Clean the tape running surfaces (the tape guides, drum, capstan shaft, pinch roller, etc.).

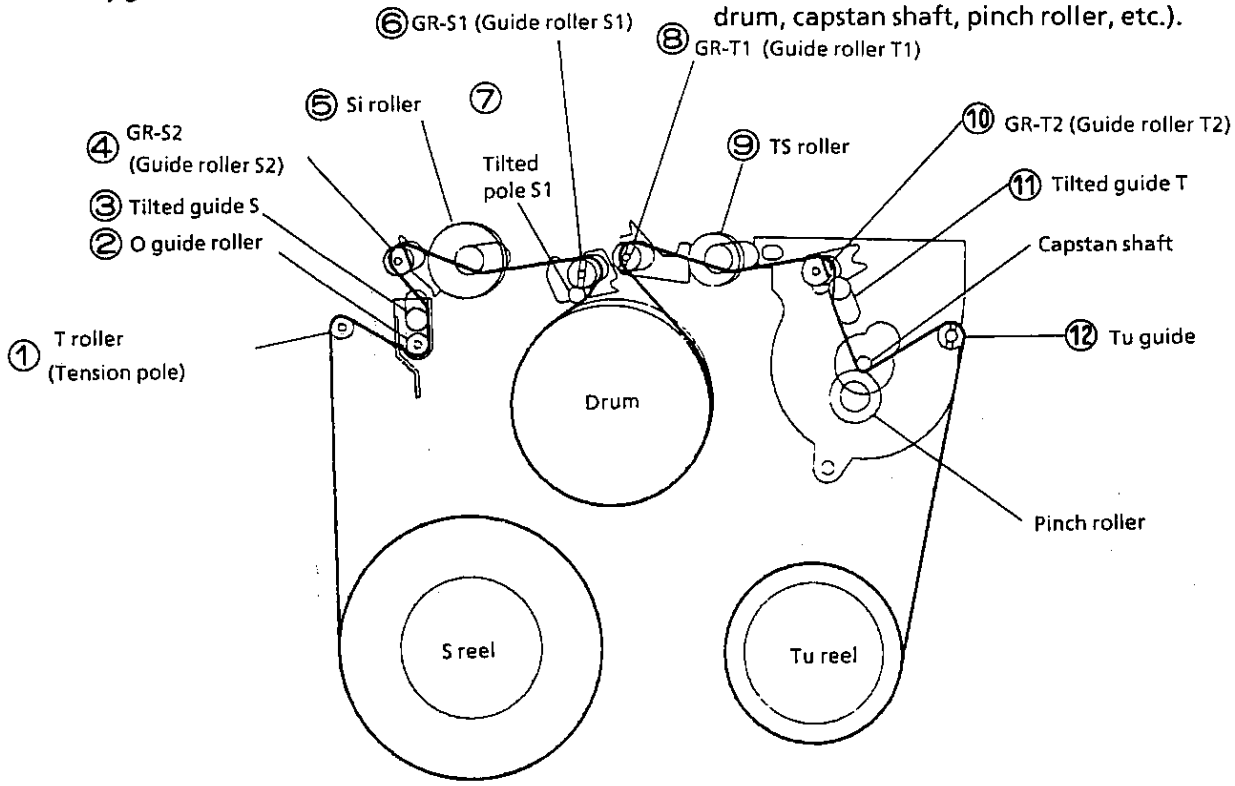


Figure 7-7-1(a). Tape Guide Allocation in Tape Travel System

2) Connect the signals to the oscilloscope (Use the test jig TEST2.) :
   Channel 1: Pin 4 of connector P 35 (Head amp PWB) for RF output.
   Channel 2: Pin 3 of connector P 35 (Head amp PWB) for trigger signal.
   GND: Pin 1 of connector P 35 (Head amp PWB) for ground.
3) Loosen the guide roller lock screws (See Fig. 7-7-1(b)), then retighten the lock screws to such extent that GR-S1 and GR-T1 can turn without strain. The adjustment will not be easy if the lock screw is too tight or too loose after retightened.

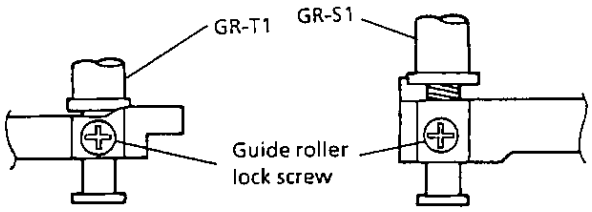


Figure 7-7-1(b).

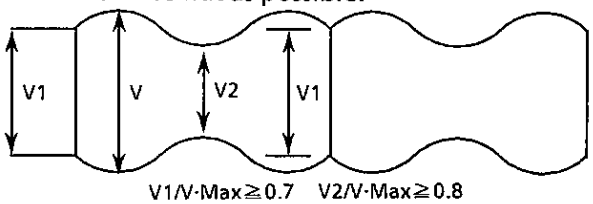
4) Install the track shift jig to the test connector P13 of the VCR main PWB.

7-7-2. TAPE TRAVEL FINE ADJUSTMENT

1) After making sure that there is no trouble in the tape travel system, play back the adjustment tape (VR2 CB0PS). Check that the tape has no great curls at the tape guides.

Note :
JIGWR2-1CP and JIGWR5-1CP are compatible. To use them, perform the running adjustment according to the Service Manual for VL-MX7S/H/X/MX98E.

2) Observing the waveform of the RF output, shift the RF output by 1/4 by using the track shift jig, and check the flatness. If the waveform of the RF output is roughly flat when the output is shifted by 1/4, the result is satisfactory. If not, adjust GR-S1 and GR-T1. While the standard flatness is as shown by Fig. 7-7-2(a), adjust the waveform as flat as possible.



V1/V-Max≧0.7 V2/V-Max≧0.8

Figure 7-7-2(a).

3) Supply side travel adjustment (GR-S1)
Check that the waveform changes at the supply side of the drum while kept in similar Fig. when the RF output is shifted by 1/4 by the track shift jig. If not, the height of GR-S1 needs proper adjustment. Adjust it till the changed waveform gets as similar to the original Fig. as possible.

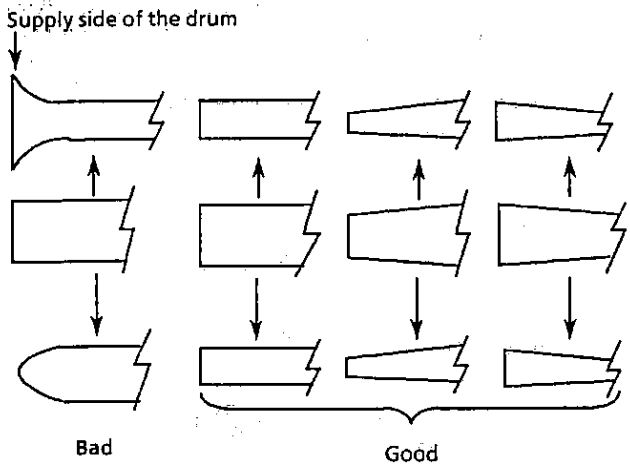


Figure 7-7-2(c).

4) Take-up side travel adjustment (GR-T1)
Like the supply side travel adjustment, adjust the height of GR-T1 till the changed waveform gets as similar to the original Fig. as possible. (See Fig. 7-7-2(e)).

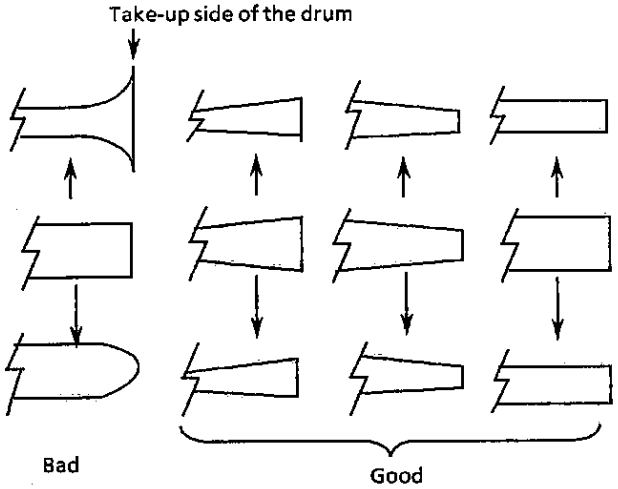


Figure 7-7-2(d).

5) After ending Steps 3) and 4), fine-adjust GR-S1 and GR-T1 so that by generally observing the waveform of the RF output, the waveform gets as flat as possible when the RF output is made maximum as well as when it is shifted by 1/4.
6) After completing the adjustment, lock GR-S1 and GR-T1 by tightening the guide roller lock screw (See Fig. 7-7-1(b)). Make sure at this point that the RF waveform does not vary.
7) Remove the track shift jig from the VCR main PWB.

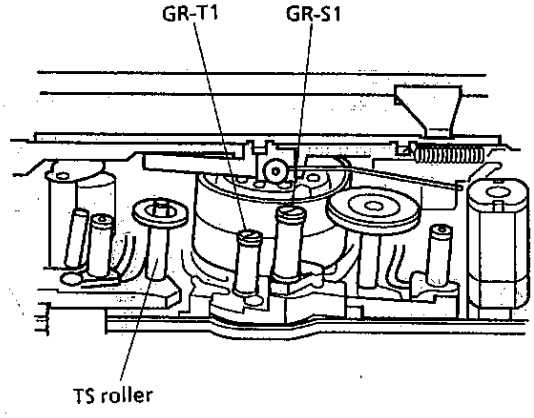


Figure 7-7-2(e).

7-7-3. CHECKING AND ADJUSTING THE PLAYBACK SWITCHING POINT

Refer to the items of "PW SWITCHING POINT ADJUSTMENT" in ADJUSTMENT OF VCR SECTION.

8. ADJUSTMENT OF VCR SECTION AND LCD SECTION

Before starting electric circuit adjustment

- Electric circuit adjustment becomes necessary, in most cases, when any of the wearable mechanical parts or the video head is replaced. Before starting electric circuit adjustment, be sure to check that the mechanical parts work perfect (i. e. the mechanical parts all been perfectly adjusted).
  In case a trouble or troubles are found in the electric circuits, be sure to down the cause(s) by using measuring instruments as described below. After locating the cause(s), then proceed to repair, replacement, or adjustment. Do not perform adjustments when adequate measuring instruments are not available.
- In order to implement a higher-density, smaller machine, most of the electric circuit parts used within the PWB units are of small-sized, surface-mounted type.
  For replacing part(s) as after-sale service, work with a soldering iron as speedily as possible. The heatresistance of the surface-mounted components is poor when compared with the larger-sized discrete parts used for television sets and stationary decks owing to their small sizes. Therefore, exercise due care so as to avoid long-time exposure of the poles of these parts to the heat of the soldering iron which may possibly cause them to have a trouble. Care should be exercised especially for chip-layer capacitor replacement.
  It is advisable to use a temperature-controlled ceramic soldering iron (Temperature at the tip: 250°C. Contacting time: Less than 5 seconds).
  < **Adjusting the liquid crystal video system** >
  Measuring instruments and others:
  - Color monitor TV set
  - Oscilloscope
  - Vector scope
  - Digital voltmeter
  - Frequency counter
  - DC power supply
  - Signal generator (PAL pattern generator LCG-399: LEADER make)
  - Audio generator (CR oscillator)
  - Video recording tape
  - Alignment tapes
    JIGWR5-9CS (Y/C system adjustment) (Servo adjustment) (SP, stereo standard tape)
    JIGWR5-8CSE (Hi-8 Y/C system adjustment)
  - AC adapter
  - DC cable (Supplied accessary)
  - Stereo AV output cable (Supplied accessary)
  - Video system extension cable

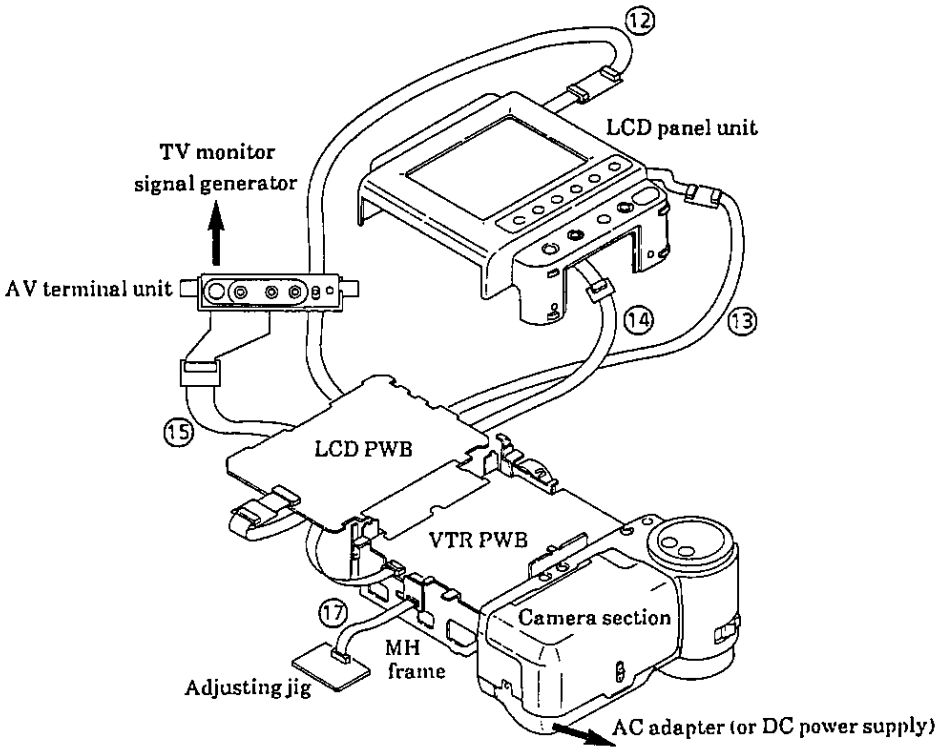
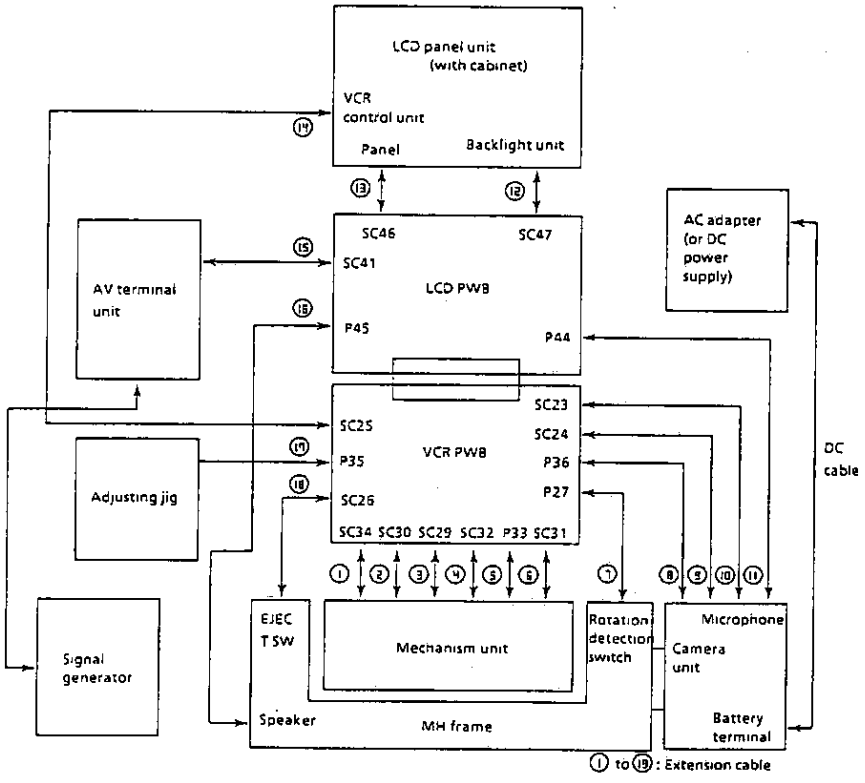


Figure 8-A-1 VCR adjusting cable

VCR.LCD extension cable				
No	Part code	Price code	Connecting point	Connector name
①	QPWBH2350TAZZ	BE	VCR PWB - Mechanism R.T FPC(16P)	SC34~FPC
②	QPWBH2347TAZZ	BF	VCR PWB - Mechanism CP.M FPC (18P)	SC30~FPC
③	QPWBH2348TAZZ	BD	VCR PWB - Mechanism D.M FPC (12p)	SC29~FPC
④	QPWBH2349TAZZ	BB	VCR PWB - Mechanism mode switch FPC (6P)	SC32~FPC
⑤	QCNW-1226TAZZ	AW	VCR PWB - Mechanism L.M wire (2P)	P33~L.M
⑥	QPWBH2379TAZZ	BE	VCR PWB - Mechanism sensor FPC (17P)	SC31~FPC
⑦	QCNW-1226TAZZ	AW	VCR PWB - Rotation detection switch wire (2P)	P27~R.S
⑧	QCNW-1229TAZZ	AW	VCR PWB - Battery terminal wire (2P)	P36~B.T
⑨	QPWBH2428TAZZ	BN	VCR PWB - Camera FPC (14P)	SC24~FPC
⑩	QPWBH2429TAZZ	BN	VCR PWB - Camera FPC (16P)	SC23~FPC
⑪	QCNW-1223TAZZ	AM	LCD PWB - Microphone wire (3P)	P44 - Microphone
⑫	QPWBH2349TAZZ	BB	LCD PWB - Backlight unit (6P)	SC47~FPC
⑬	QPWBH2347TAZZ	BF	LCD PWB - LCD panel (18P)	SC46~FPC
⑭	QCNW-1238TAZZ	AW	VCR PWB - VTR control unit (6P)	SC25~FPC
⑮	QCNW-1239TAZZ	AZ	LCD PWB - AV terminal unit (20P)	SC41~FPC
⑯	QCNW-1226TAZZ	AW	LCD PWB - Speaker (2P)	P45~S.P
⑰	QPWBN2408TAZZ or QPWBF2450TAZZ QCNW-1292TAZZ	BY BF	Adjusting jig	P35
⑱	QCNW-1240TAZZ	AW	VCR PWB - Eject switch (3P)	SC26~FPC

Table 8-B-1



Basic connection diagram for VCR.LCD section servicing

Figure 8-A-2

Precautions

As for the extension cable, the current model and others are also partly used. Therefore, the information described on the label attached to the extension cable corresponds to the previous models. When using this machine, interpret the information shown on the label as follows.

No.	Parts code	Information on label		Remarks
		Previous models	VL-HL series	
①	QPWBH2350TAZZ	K3886HE K3891HE SC20	K4051HE SC34	
		DMECV1020GE MEC. SENSOR FPC	DMECV1020GE HEAD FPC	
②	QPWBH2347TAZZ	K3886HE K3891HE SC30	K4051HE SC30	
		DMECV1020GE CAP. MOTOR WIRE	DMECV1020GE CAP. MOTOR FPC	
③	QPWBH2348TAZZ	K3886HE K3891HE SC29	K4051HE SC29	
		DMECV1020GE DRUM MOTOR FPC	←	
④	QPWBH2349TAZZ	K3886HE K3891HE SC21	K4051HE SC32	
		DMECV1020GE MODE SW FPC	←	
⑥	QPWBH2379TAZZ	K3917HE SC20	K4051HE SC31	
		DMECV1020GE MECA SENSOR FPC	←	
⑦	QCNW-1226TAZZ	K4051HE P33	K4051HE P27	
		DMECV1020GE LOAD. MOTOR	LCD REW SW QSW-Z0052TAZZ	
⑪	QCNW-1223TAZZ	K2358PM K2404PM P6	K4052HE P44	
		AUDIO CABLE	←	
⑫	QPWBH2349TAZZ	K3886HE K3891HE SC21	K4052HE SC47	
		DMECV1020GE MODE SW FPC	BACK LIGHT UNIT RUNTK0288TAZZ	
⑬	QPWBH2347TAZZ	K3886HE K3891HE SC30	K4052HE SC46	
		DMECV1020GE CAP. MOTOR WIRE	LCD PANEL RUNTK0359CE01	
⑯	QCNW-1226TAZZ	K4051HE P33	K4052HE P45	
		DMECV1020GE LOAD. MOTOR	SPEAKER VSP0028P-25YN	

USAGE OF ADJUSTMENT MODE SETTING JIG (QPWBN2408TAZZ or QPWBF2450TAZZ, QCNW-1292TAZZ)

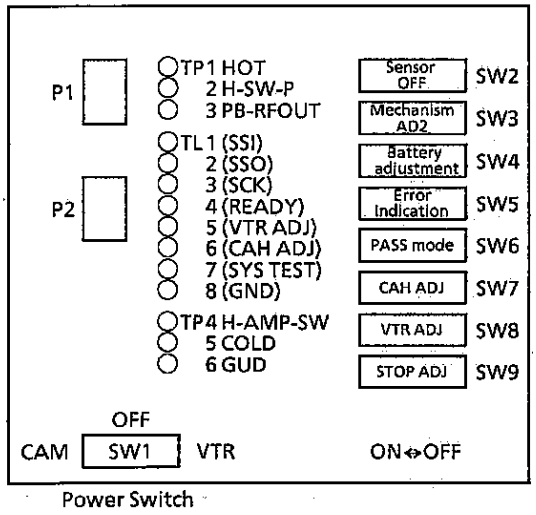


Figure 8-A-3

1. Connect the jig to the connector P35 of VCR PWB (DUNTK4051HE01).
2. Set the SW1 to camera side or VCR side, and turn on power supply.
3. Using the SW2 to SW9, set the pertinent test mode.

SW ON:
Mechanism sensor OFF mode
→ This mode is used to actuate the mechanism PWB without tape.

SW3 ON:
Mechanism adjustment mode
→ This mode is used to adjust the mechanism.

SW4 ON:
Battery adjustment mode
→ This mode is used to adjust the battery sensor.

SW5 ON:
Error display mode
→ This mode is used to display the encountered error on the LCD screen or battery adjustment error.

SW6 ON:
PASS mode
→ This mode is used to make tracking shift when adjusting travel.

SW7 ON:
Camera adjustment mode
→ This mode is used to adjust the camera section.

SW8 ON:
VTR adjustment mode
→ This mode is used to adjust the VCR section.

SW9 ON:
H-SW-P adjustment mode
→ This mode is used for automatic adjustment of H-SW-P. usually, adjustment must be made in the VTR adjustment mode by the specified adjusting method.

The switch (SW2 to SW9) having larger SW number is preferred to the switch having smaller SW number (for example, SW4 has higher priority to SW2).

4. After completion of adjustment turn off the pertinent switch, and disconnect the jig.

8-1. EEPROM ADDRESS/DATA SETTING

In this unit, the adjustment data is memorized in the EEPROM which comprises two systems; VTR LCD and CAMERA. When the data is to be changed, the adjustment value of the EEPROM must be changed.

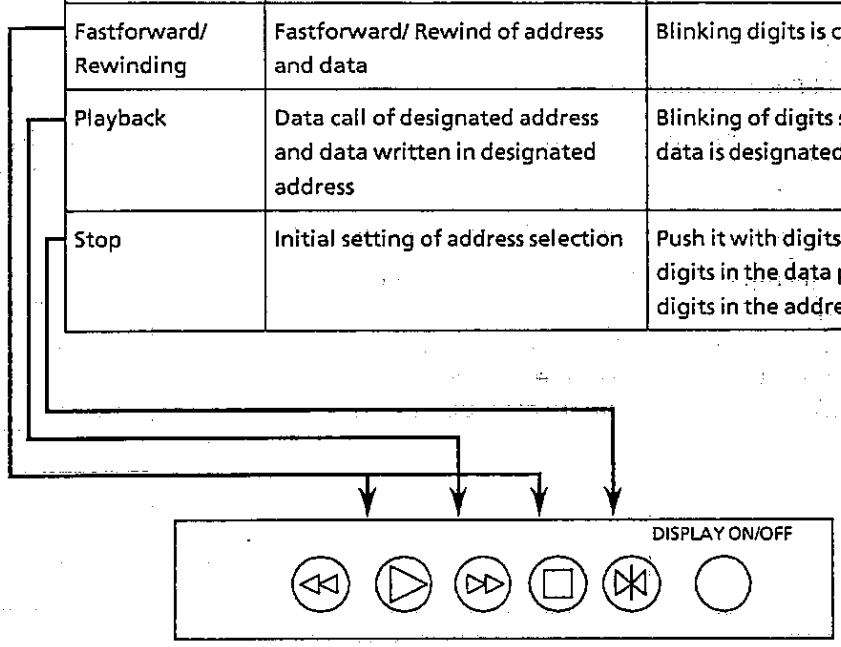
8-1-1. OPERATION PROCEDURE

Setting the adjustment data of EEPROM as follows.

No.	Operation procedure		Monitor display (▭ indicates blinking)
	VTR LCD adjustment	CAMERA adjustment	
1	Turn on power sw to video.	Turn on power sw to camera.	
2	Set to the VTR LCD adjustment mode. In upper left of the monitor, the character"V ADJ" and the numerical value "00" appear and "00" blinks.	Set to the camera signal adjustment mode. In upper left of the monitor, the character"CAM ADJ" and the numerical value "00" appear and "00" blinks.	VTR LCD V ADJ 00 CAMERA CAM ADJ 00
3	Then push "Fastforward" (or "Rewind" key, the address is changed and "01" blinks. (Address call)		V ADJ 01
4	Then push "Playback" key , "01" blinking stops and the data appears in the data display.(Data call)		V ADJ 01 ** Factory setting
5	Then push "Fastforward" (or "Rewind" key, the digits changes with blinking in the data display. According to the adjustment procedure, set the numerical value to the specified value.		V ADJ 01 ** Changed by key
6	Then push "Playback" key, newly changed data is written in the address and the data blinking stops.		V ADJ 01 **
7	If further adjustment is required, repeat from the step 3.		

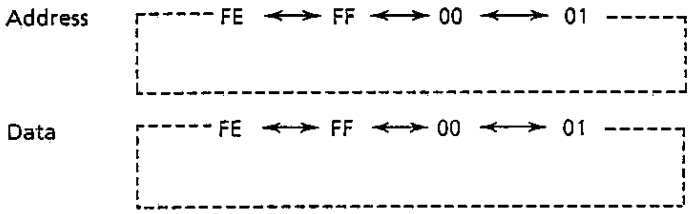
The functions of operation switches are as follows:

	Function	Operation
Fastforward/ Rewinding	Fastforward/ Rewind of address and data	Blinking digits is changed.
Playback	Data call of designated address and data written in designated address	Blinking of digits stops and address or data is designated.
Stop	Initial setting of address selection	Push it with digits not blinking, the digits in the data part vanishes and the digits in the address part blinks.

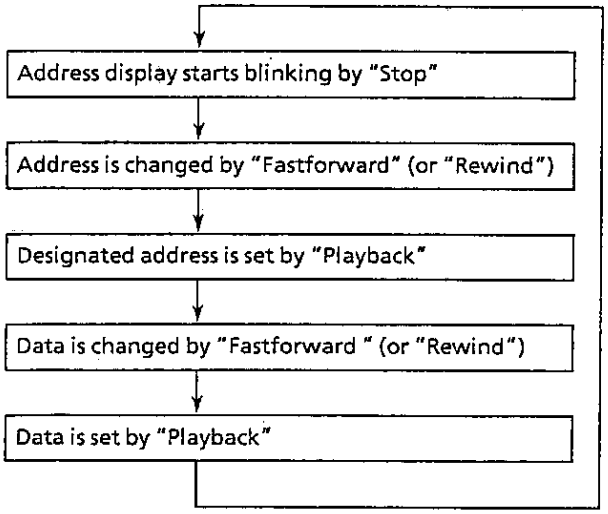


VTR operation unit

* If pushing "Fastforward" (or "Rewind") is kept for over 0.3 seconds, the operation is repeated. At the data change, if pushing is kept further for more than 2 seconds, the data is changed by ±4. The selection order of address and data indicated by bioctonal system is shown below.



* Operation of plural change


Address display starts blinking by "Stop"
Address is changed by "Fastforward" (or "Rewind")
Designated address is set by "Playback"
Data is changed by "Fastforward " (or "Rewind")
Data is set by "Playback"

Notes:

(1) The data other than the data to be changed must be unchanged.
(2) In the adjustment mode, do not touch the other keys unrelated to the adjustment.
In case that the call and the change of the adjustment data can not be operated, release the adjustment mode and repeat the adjustment mode setting according to the above procedure.

8-1-2. RETURNING TO THE NORMAL MODE

1. Turn off all switchs of the jig.
2. Push the RESET switch of the jig, or turn off the power switch once, and again set to VIDEO or CAMERA.
3. Normal mode sets in.

VTR LCD system adjustment data sheet

Address	Item	
03	16.5V voltage	Power
04	Y level	
05	Comb filter gain	
06	Comb filter phase	
08	Emphasis	
09	Carrier	
0A	Deviation	
0B	Carrier (Hi8)	
0C	Deviation (Hi8)	
0D	REC chroma	
0F	REC Y	
10	REC Y (Hi8)	
11	Deemphasis	
12	Deemphasis (Hi8)	
13	PB level	
14	Contrast	
15	R-W/B	

Address	Item	
16	B-W/B	
17	VCO	
18	Horizontal position	
19	Common voltage	
1A	Main fo	Audio
1B	Sub fo	Audio
1C	Main deviation	Audio
1D	Sub deviation	Audio
1E	Matrix	Audio
23	Burst Phase	
24	Back light control	
25	Heater control	
7A	Head switching point	System controller
7B	(7A + 7B and FF)	Servo
7C	Battery senser voltage	System controller
7D	(7C + 7D and FF)	Servo

The addresses from 48 to 4F cover the time accumulating value of the drum motor, capstan motor and cassette eject. It should be refered to for servicing.

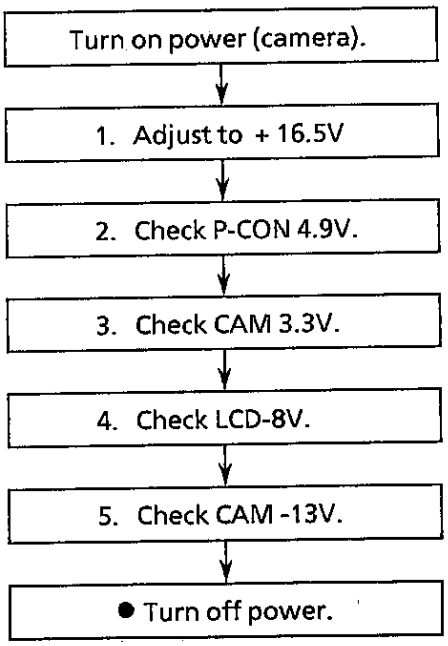
Addr.	Data	Item
48 49 4A	OPE TIME(1) L M H	Drum motor Total operation time unit: second (0-FFFFF: Max 16770000sec. = 4660 hours)
4B 4C 4D	OPE TIME(2) L M H	Capstan motor Total operation time unit: second (0-FFFFF: Max 16770000sec. = 4660 hours)
4E 4F	EJECT CNT L H	Cassette eject time unit: time (Max 65535 times)

* The code numbers for the addresses 72h and 73h are different depending on the models. Do not change the code number corresponding to the related model, otherwise the unit does not operate normally.

	Address 72h	Address 73h
VL-H400S	02	FD
VL-H400H	02	FD
VL-H9E	03	FC
VL-H400X	04	FB

8-2. POWER CIRCUIT ADJUSTMENT

8-2-1. POWER CIRCUIT ADJUSTMENT PROCEDURE



8-2-2. POWER CIRCUIT ADJUSTMENT METHOD

- Input 6V from the battery terminal, and set the power switch to the camera side.

1. Adjustment to + 16.5V

Measuring instrument	Digital voltmeter
Measuring terminal	SC23(10) pin or TL748
Adjustment address	03
Standard	16.5V ± 0.1V

1) Make an adjustment so that the digital voltmeter indicates 16.5V ± 0.1V.

2. Checking of P-CON4.9V

Measuring instrument	Digital voltmeter
Measuring terminal	W21(79) pin or TL3489
Adjustment address	
Standard	4.87V ± 0.05V

1) Check that the digital voltmeter indicates 4.87V ± 0.05V.

3. Checking of CAM3.3V

Measuring instrument	Digital voltmeter
Measuring terminal	SC23(8) pin or TL747
Adjustment address	
Standard	3.3V ± 0.1V

1) Ascertain that the digital voltmeter indicates 3.3V ± 0.1V.

4. Checking of LCD-8V

Measuring instrument	Digital voltmeter
Measuring terminal	W21 pin
Adjustment address	
Standard	-8.2V ± 0.5V

1) Ascertain that the digital voltmeter indicates – 8.2V ± 0.5V.

5. Checking of CAM-13V

Measuring instrument	Digital voltmeter
Measuring terminal	SC23(9) pin or TL742
Adjustment address	
Standard	-16.3V ± 1V

1) Ascertain that the digital voltmeter indicates – 16.3V ± 1V.

- Turn off power supply.

8-3. ADJUSTMENT OF SYSTEM CONTROLLER AND SERVO CIRCUIT

8-3-1. ADJUSTMENT OF PLAYBACK SWITCHING POINT

Item	Adjusting method	
Measuring instrument	Oscilloscope	
Mode	Playback	
Measuring terminal	GND TP1405 H-SW-P servicing, adjusting jig TP2 or W21(14) pin (TL3424) Video output TP1401	
Adjustment	7Ah	7Bh
Tape	Alignment tape (JiGWR5-9CS)	

In the address 7Bh, the value FFh minus 7Ah is written.

1) Connect each signal to the oscilloscope. (Use the P37 connector lead-out wire.)
   1 c h : TP1401 video output
   2 c h : H-SW-P...Trigger signal
   G N D : TP1405...GND
2) Play back the adjustment tape (JiGWR5-9NS).
3) Set the synchronization slope of oscilloscope to (-), and adjust so that the interval between the trigger point and the V synchronizing signal becomes equal to 6H. (Figure 8-3-1)
4) Then set the synchronization slope to (+), and ascertain that the interval between the trigger point and the V synchronizing signal is 6H. (Figure 8-3-2)

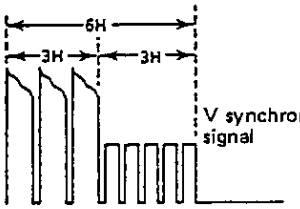


Figure 8-3-1

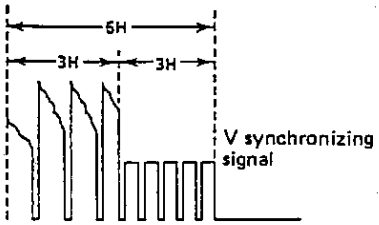


Figure 8-3-2

8-3-2. ADJUSTMENT OF BATTERY ALARM

Item	Adjusting method	
Mode	Camera record	
Measuring place		
Adjustment address 01	7Ch	7Dh
Standard	LCD counter indication LCD + 0	
Jig	QCNW-1165TAZZ	

In the address 7Dh, the value FFh minus 7Ch is written.

1) Connect the adjusting jig for servicing to P35 (TEST2 connector).
2) Turn on SW(4) of adjusting jig for servicing, and set the battery alarm adjustment mode.
3) Set the power voltage to 5.40V at TL953 input side.
4) Turn on the power switch in the camera mode.
5) Press the playback key switch (VTR operation key switch).
6) The battery indication appears on the LCD screen and then disappears. Thus, the adjustment has been finished.

8-3-3. ERROR MESSAGE

For easier troubleshooting and test the special function has been provided.

8-3-3-1. ERROR MESSAGES

When the sensor is actuated, error data is sent to the display microcomputer, and a specific number is displayed on the counter display of view finder.

No.	Description
E007	CAP GF is not input for more than 1 sec.
E011	The operation mode cannot be changed to the next mode although L/M is normally rotating for more than 5 sec (or 10 sec).
E012	The operation mode cannot be changed to the next mode although L/M is rotating inversely for 5 more than sec (or 10 sec).
E020	DRUM FG is not input for more than 100 nsec.
E025	The TU reel sensor was actuated.
E026	The SU reel sensor was actuated.

Note:
The errors E020, 025 and 026 occur due to tape damage or condensation rather than due to machine trouble. Therefore, when error E020, 025 or 026 occurs, be sure to once take out the cassette, and try playback again to check operation.

8-4. Y/C SYSTEM ADJUSTMENT

8-4-1. Y/C CIRCUIT ADJUSTING PROCEDURES

● Input Signal Conditions

Instrument set-up

For electrical adjustments of the Y/C circuit, a pattern generator is used to feed the video signal. It is important that the video signal output is as specified. Connect the oscilloscope to the video input and output terminals. Make sure the oscilloscope waveform of the video signal is as follows: video sync signal's amplitude at about 0.3 Vp-p; video portion's amplitude at about 0.7 Vp-p; burst signal amplitude at about 0.3 Vp-p and its top and bottom as flat as possible; and the level ratio of the burst signal to the red bar at 0.30 : 0.66. Figure A. shows the video signal waveform for the standard color bars.

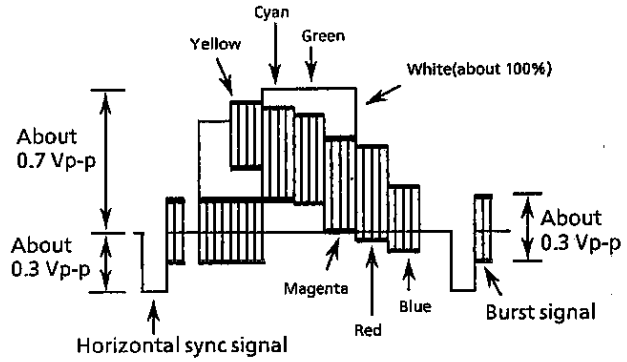


Figure A.
Color bar signal from pattern generator

※ When there is no Pattern Generator Available:

In this case, shoot a color bar chart (JIGCHART-4) with a completely adjusted camcorder. Set the illumination so that the camcorder's video signal output (terminated with 75- ohm impedance) is as shown in Figure B. This color bar signal can be used as an input signal for electrical adjustments.

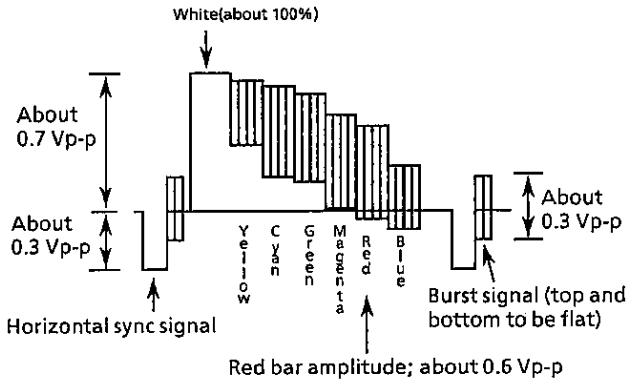


Figure B.
Color bar signal obtained by camcorder

For VL-H400S/H, take the following procedure before Y/C circuit adjustment. (It is unnecessary for VL-H400X/H9E.)

1) Set the unit to VTR adjustment mode by using adjustment jig.
   Then set the following addresses and data by operation switch.

address	data
72	04
73	FB

2) Remove the battery or disconnect the AC adaptor once, and then set them again. (Check that the lithium battery has been removed then.)
3) Start Y/C circuit adjustment.

1. Adjustment of input level

Measuring instrument	Oscilloscope
Mode	VCR STOP
Input signal	Color bar (Figure A)
Measuring point	TP1401
Adjustment address	04
Set point	2.0 ± 0.1Vp-p

1) Set the input/Output Selection Menu to Input.
2) Set the VCRSTOP mode.
3) Input the color bar signal from the video input/output terminal.
4) Set the VTR adjustment mode, using the adjusting jig, and set the address with the control switch.
5) Make an adjustment with Fast Forward/Rewind key so as to get 2.0Vp-p between sync tip and White on TP1401.

Notes:

- When adjustment is made by inputting the video input into the vide input/output terminal, do not connect the S cable to the S terminal. If this cable is connected, signal cannot be input.
- When the adjusting jig is used, don't use the main body power switch (off state), but use the power switch of jig.

2. Adjustment of comb filter

Measuring instrument	Oscilloscope
Mode	VCR STOP
Input signal	Color bar (Figure A)
Measuring point	TP402
Adjustment address	Phase: 06 Gain: 05
Set point	Chroma level min.

1) Set address, using the operation switch.
2) Make an adjustment with the operation switch in order of Phase - Gain - Phase so as to minimize the residual chroma component on TP402.

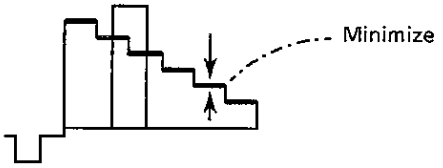


Figure 8-4-1

3. Adjustment of preemphasis input level

Measuring instrument	Oscilloscope
Mode	VCR STOP
Input signal	Color bar (Figure A)
Measuring point	TP403
Adjustment address	08
Set point	500 ± 20mVp-p

1) Set address, using the operations switch.
2) Make an adjustment with the operation switch R493 so as toget 500mVp-p between sync tip and White on TP403.

4. Adjustment of deemphasis input (normal)

Measuring instrument	Oscilloscope
Mode	Playback
Tape	Standard tape (JiGWR5-9CS) Color bar state
Measuring point	TP406
Adjustment address	11
Set point	500 ± 25mVp-p

1) Once cancel the VTR adjustment mode of adjusting jig, set the output mode, set the standard tape, and play back the color bar part.
2) Set the VTR adjustment mode with the adjusting jig, and set the address with the operation switch.
3) Make an adjustment with the operation switch so as to get 500mVp-p between sync tip and White on TP406.

5. Adjustment of deemphasis (Hi-8)

Measuring instrument.	Oscilloscope
Mode	Playback
Tape	Standard tape (JiGWR5-8CSE) Color bar state
Measuring point	TP406
Adjustment address	12
Set point	500 ± 25mVp-p

1) The same as stated in item 5-1), 2), and 3).

6. Adjustment of PB-Y level (Hi-8)

Measuring instrument	Oscilloscope
Mode	Playback
Tape	Standard tape (JiGWR5-8CSE) Color bar state
Measuring point	TP1402
Adjustment address	13
Set point	2.0 ± 0.1Vp-p

1) Set address with the operation switch.
2) Make an adjustment with the operation switch so as to get 2.0Vp-p between sync tip and White on TP1402.

7. Adjustment of YFM carrier (normal)

Measuring instrument	Frequency counter
Mode	VCR STOP
Input signal	No signal
Measuring point	TP404
Adjustment address	09
Set point	4.38 ± 0.02 MHz

1) Cancel the VTR adjustment mode with the adjusting jig, and set the VCR STOP mode.
2) Set address with the operation switch.
3) Set video input to "NOINPUT".
4) Make an adjustment with the operation switch so that the frequency counter indicates 4.38 MHz on TP408.

8. Adjustment of YFM carrier (Hi-8)

Measuring instrument	Frequency counter
Mode	VCR STOP
Input signal	No signal
Measuring point	TP404
Adjustment address	0B
Set point	5.98 ± 0.02 MHz

1) The same as stated in item 8-1)
2) The same as stated in item 8-2)
3) Set video input to "NOINPUT".
4) Make an adjustment with the operation switch on TP404 so that the frequency counter indicates 5.98 MHz.

9. Adjustment of YFM deviation (normal)

Measuring instrument	Oscilloscope
Mode	VCR REC/PB
Input signal	Color bar (Figure A)
Measuring point	TP1401
Adjustment address	0A
Set point	2.0 ± 0.1Vp-p

1) Once cancel the VTR adjustment mode with the adjusting jig.
2) Set the normal tape.
3) Record the color bar signal, and stop at proper length to set the program top.
(Push BLC button when recording by VL-H400S/H.)
4) Display the menu on the screen, and set the input/output selection to OUTPUT mode.
5) Play back the record, and measure the part between sync tip of TP1402 and White.
6) Set the VTR adjustment mode with the adjusting jig, and set address with the operation key.
7) If the level measured in step 5) above is high, change the data so as to reduce it with the operation key, but if the level is low, change the data to increase it.
8) Repeat the steps 1) to 7) so as to get playback video signal level of 2.0Vp-p on TP1402.

10. Adjustment of YFM deviation (Hi-8)

Measuring instrument	Oscilloscope
Mode	VCR REC/PB
Input signal	Color bar (Figure A)
Measuring point	TP1401
Adjustment address	0C
Set point	2.0 ± 0.1Vp-p

1) The procedure is the same as stated in item 10 above. Adjustment in Hi-mode is performed with the aid of Hi-8 tape.

11. Adjustment of Y record current (normal)

Measuring instrument	Oscilloscope
Mode	VCR STOP
Input signal	Color bar (Figure A)
Measuring point	TEST 2 connector SC35 (1) and (16) pins
Adjustment address	0F
Set point	Ya ± 10mVp-p (refer to the description below.)

1) Cancel the VTR adjustment mode with the adjusting jig, and set the input mode on the menu screen.
2) Input the color bar signal from the video input/output terminal.
3) Set the VTR adjustment mode with the adjusting jig, and set address with the operation key.
4) Measure amplitude of sync tip of TEST2 connector (1) pin waveform (Figure 8-3-2), and let the obtained amplitude be A. (When the address is set and data is displayed, waveform is output.)
5) Similarly, observe the (16) pin waveform, and measure the amplitude of sync tip. Let the obtained amplitude be B.
6) Calculate value, using the following formula.

$$Ya = \frac{A}{A-B} \times 220\ [mVp\text{-}p]$$

7) Observe the TEST2 connector (1) pin, and set data with the operation key so that the amplitude of sync tip becomes equal to the Ya value calculated in step 6) above.
8) Ascertain that the difference of amplitudes of (1) and (2) pins is 220mVp-p.

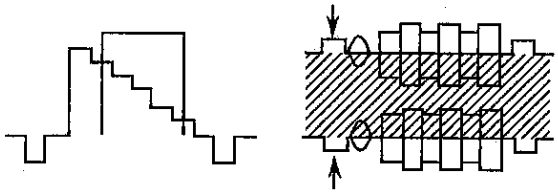


Figure 8-4-2.

12. Adjustment of Y record current (Hi-8)

Measuring instrument	Oscilloscope
Mode	VCR STOP
Input signal	Color bar (Figure A)
Measuring point	TEST 2 connector SC35 (1) pin
Adjustment address	10
Set point	Yb ± 10mVp-p

1) The same as stated in items 12-1), 1), 2), and 3)
2) Calculate value, using the following formula. A and B are values measured in item 12 above.

$$Yb = \frac{A}{A-B} \times 200\ [mVp\text{-}p]$$

3) Observe the TEST2 connector (1) pin, and set data with the operation key so that the amplitude of sync tip becomes equal to the Yb value calculated in step 2) above.
4) Ascertain that the difference of amplitudes of (1) and (2) pins is 200mVp-p.

13. Adjustment of C record current

Measuring instrument	Oscilloscope
Mode	VCR STOP
Input signal	Color bar (Figure A)
Measuring point	TEST 2 connector SC35 (1) pins
Adjustment address	0D
Set point	Ca ± 3mVp-p

1) The same as stated in items 12-1, 2), and 3)
2) Calculate value, using the following formula. A and B are values measured in item 12 above.

$$Ca = \frac{A}{A-B} \times 35\ [mVp\text{-}p]$$

3) Observe the TEST connector (1) pin, and set data with the operation key so that the amplitude of red part of waveform becomes equal to Ca value.
4) Ascertain that the difference of amplitudes of (1) and (2) pins is equal to 35mVp-p.

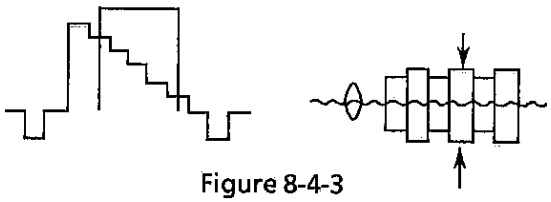


Figure 8-4-3

For VL-H400S/H, take the following procedure after Y/C circuit adjustment. (Note: Be sure to take the procedure for VL-H400S/H; but it is unnecessary for VL-H400X/H9E.)

1) Set the unit to VTR adjustment mode by using adjustment jig.
   Then set the following addresses and data by operation swich.

address	data
72	02
73	FD

2) Remove the battery or disconnect the AC adaptor once, and then set them again. (Check that the lithium battery has been removed then.)

Finally, cancel the VTR adjustment mode of adjusting jig.

8-5. AUDIO CIRCUIT ADJUSTMENT

Note: The data enclosed between brackets [ ] is for sub-CH.

1. "fo" adjustment

Measuring instrument	Digital voltmeter
Mode	Camera EE
Input signal	
Measuring point	TP610 [TP609]
Adjustment address	1A[1B]
Set value	2.05 ± 0.20V

1) Connect the digital voltmeter to TP610 [TP609], and make an adjustment so as to get an indication of 2.05 ± 0.20V.

Notes: Since voltage response of measuring point is slow during adjustment, it takes longer time to stabilize the indication (usually 5 to 6 seconds).

2. Adjustment of playback level

Measuring instrument	Valve voltmeter
Mode	Playback
Input signal	
Measuring point	TP616[TP613]
Adjustment address	1C[1D]
Set value	-8dBs ± 0.5dB

1) Before adjusting set the data of adjustment address:1E to 00. Record in advance the data which has been set previously and exists currently at the address :1E.
2) Connect the valve voltmeter to TP616[TP613].
3) Play back the stereo standard tape (JiGWR5-9CS), and make an adjustment so as to get an indication of -8dBs ± 0.5dB.
4) After completion of adjustment of main CH and sub-CH return the initially stored data to the adjustment address:1E.
   After adjustment of playback level it is necessary to perform the following playback matrix adjustment in succession.

3. Adjustment of playback matrix

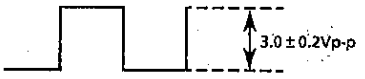
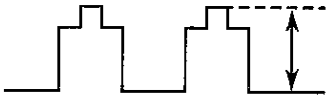
Measuring instrument	Oscilloscope
Mode	Playback
Input signal	
Measuring point	TP616
Adjustment address	1E
Set value	Minimum (1 kHz component)

1) Connect the oscilloscope to TP616.
2) Observing the oscilloscope, play back the stereo standard tape (JiGWR5-9CS), and make an adjustment so that 1 kHz component becomes minimum and 400 Hz component remains.

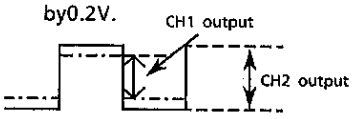
Reference
If the valve voltmeter is not available for playback level adjustment, it is possible to set to 873 mVp-p ± 50 mV with the oscilloscope.

8-6. LCD DISPLAY CIRCUIT ADJUSTMENT

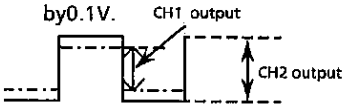
1. CONTRAST ADJUSTMENT

Measuring place	TP803
Address	14
Mode	VTR Printer input EE mode
Adjusting method	(1) Set the bright level at the address 21. (Printer noninput signal)  (2) Input white 100% signal as input. (3) Disconnect FPC of LCD panel from the connector (SC46). (4) Connect TP837 to GND. (1H inversion stop) (5) Adjust output waveform of TP803(G output) between pedestal and SYNC tip. 
Adjustment standard	3.0±0.2Vp-p
Remarks	TP803 output impedance, less than 100 ohm

2. Red/white balance adjustment

Measuring place	TP803, TP804
Address	15
Mode	VTR Printer input EE mode
Adjusting method	(1) Set the Printer input to "nonsignal". (2) TP803(G output): Oscilloscope CH1 TP804(R output): Oscilloscope CH2 (3) Set the interval of the pedestals of CH2 larger than that of CH1 by0.2V. 
Adjustment standard	R output (CH2) ±0.1V
Remarks	———

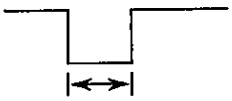
3. Blue/white balance adjustment

Measuring place	TP802, TP803
Address	16
Mode	VTR Printer input EE mode
Adjusting method	(1) Set the Printer input to "nonsignal". (2) TP803(G output): Oscilloscope CH1 TP802(B output): Oscilloscope CH2 (3) Set the interval of the pedestals of CH2 larger than that of CH1 by0.1V. 
Adjustment standard	B output (CH2) ±0.1V
Remarks	———

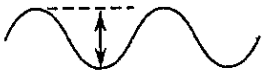
4. VCO fo adjustment

Measuring place	TP807
Address	17
Mode	VTR Printer input EE mode
Adjusting method	(1) Set the Printer input to "nonsignal". (2) Connect the frequency counter to TP807, and set frequency.
Adjustment standard	15.625kHz±100Hz
Remarks	———

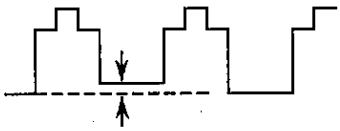
5. Horizontal position adjustment

Measuring place	TP807
Address	18
Mode	VTR Printer input EE mode
Adjusting method	(1) Input white 100% signal as Printer input. (2) TP807(HD pulse): oscilloscope (3) Set the HD pulse width. 
Adjustment standard	5.5 ± 0.3 µsec
Remarks	———

6. Common bias adjustment

Measuring place	LCD panel display
Address	19
Mode	VTR Printer input EE mode
Adjusting method	(1) Set the bright level (address 21) 7F with the printer input nonsignal. (2) Input the white 40% signal to the printer input. (3) Fix the illuminometer on the panel (prevent influence of ambient light). (4) Connect the analog output of illuminometer to the oscilloscope. (5) Make an adjustment so as to minimize the output waveform ripple.  Response Time: 0.6 sec * Or set to the point where black (gray scale signal) attains the highest blackness.
Adjustment standard	Minimum
Remarks	Do adjustment after aging for about 1 minute (so as to stabilize luminance of backlight). At this time keep the backlight in "Normal" mode.

7. Burst phase adjustment

Measuring place	TP802
Address	23
Mode	VTR Printer input EE mode
Adjusting method	(1) Input the monochrome signal (R) to Printer input (2) TP802 (Boutput): osilloscope (3) Connect TP837 to the ground. (Every 1H reverse stops.) (4) Set the address 22 (color level) data to 55. (5) Minimize the signal level diffence every 1H.  Minimum adjustment
Adjustment standard	Minimum
Remarks	———

8. Protector circuit operation inspection

Measuring place	TL420
Address	———
Mode	VTR Printer input EE mode
Adjusting method	(1) Place the resistor 1kΩ to TL842 in series and apply +6.5V and 0V. (2) Ascertain that the lamp indication is displayed on the LCD screen.
Adjustment standard	———
Remarks	———

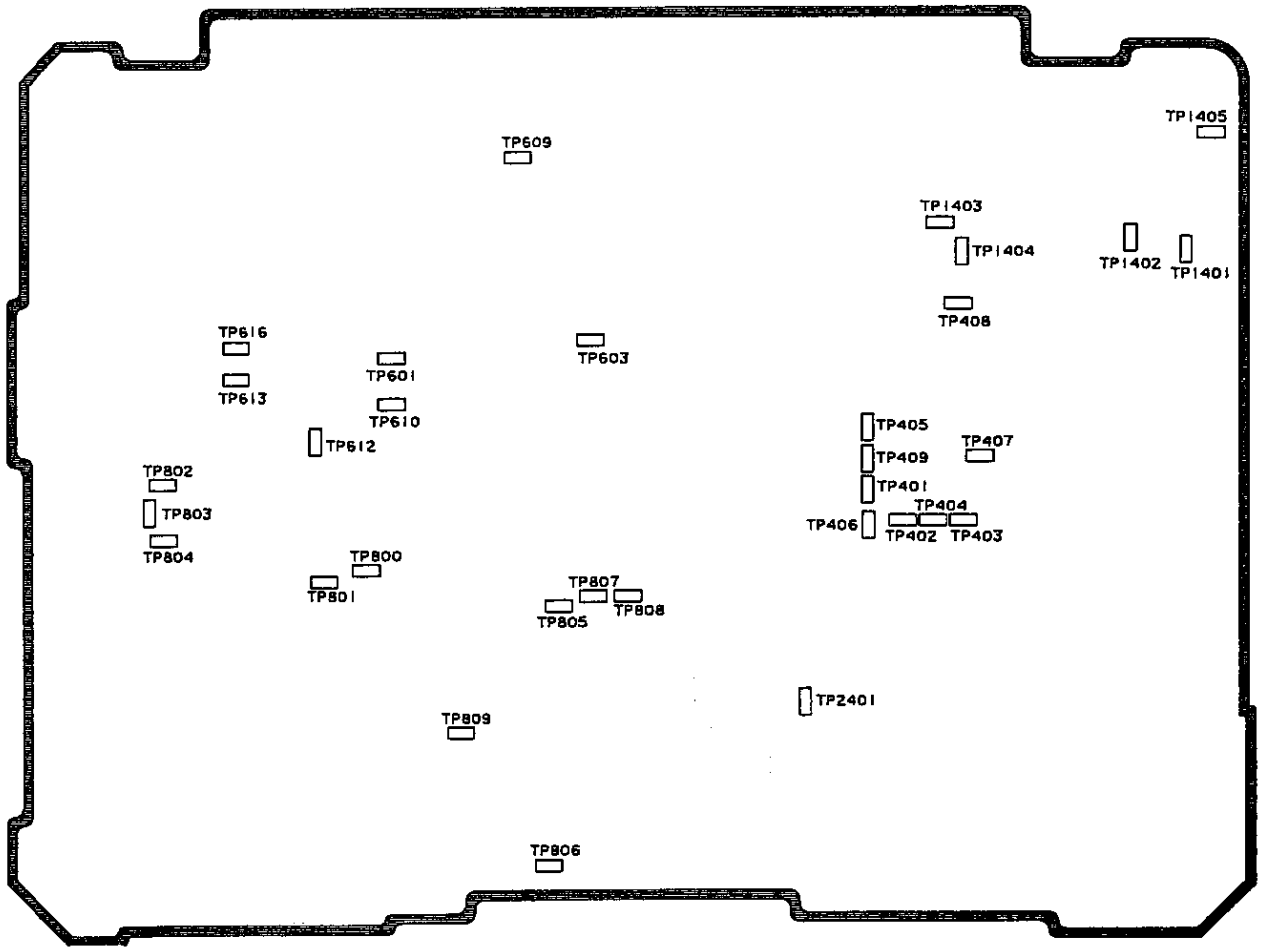
9. Common bias operation inspection

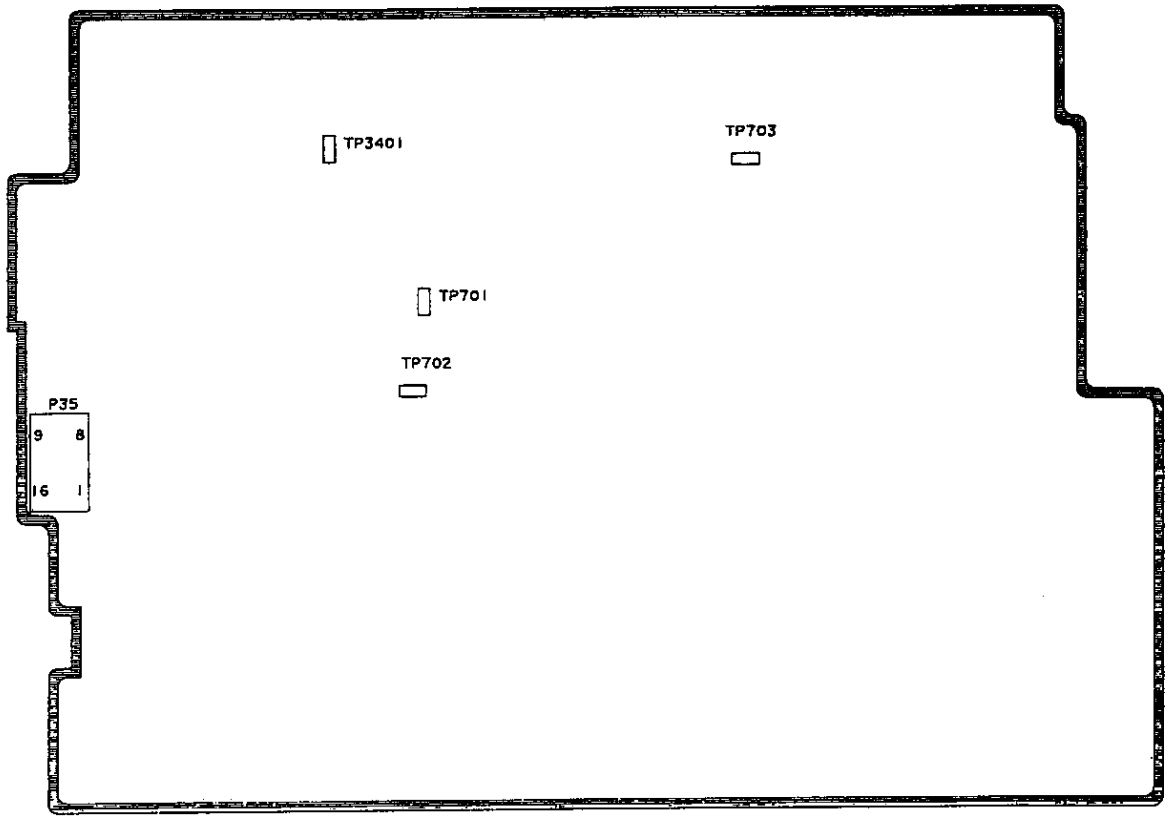
Measuring place	————
Address	————
Mode	VTR Printer input EE mode
Adjusting method	(1) Input pan signal (horizontal pan) as Printer input. (2) Check that the vertical stripes are not remarkable. (3) If the vertical stripes are remarkable, do gain adjustment of item 6.
Adjustment standard	————
Remarks	————

10. White balance inspection

Measuring place	————
Address	————
Mode	VTR Printer input EE mode
Adjusting method	(1) Set VTR white fade. (2) Make an adjustment so as to get the same white screen as that of monitor (do again adjustment of items 2 and 3).
Adjustment standard	————
Remarks	Do adjustment after aging for about 1 minute (so as to stabilize luminance of backlight).

8-7. LOCATION OF TEST POINT AND CONTROLS





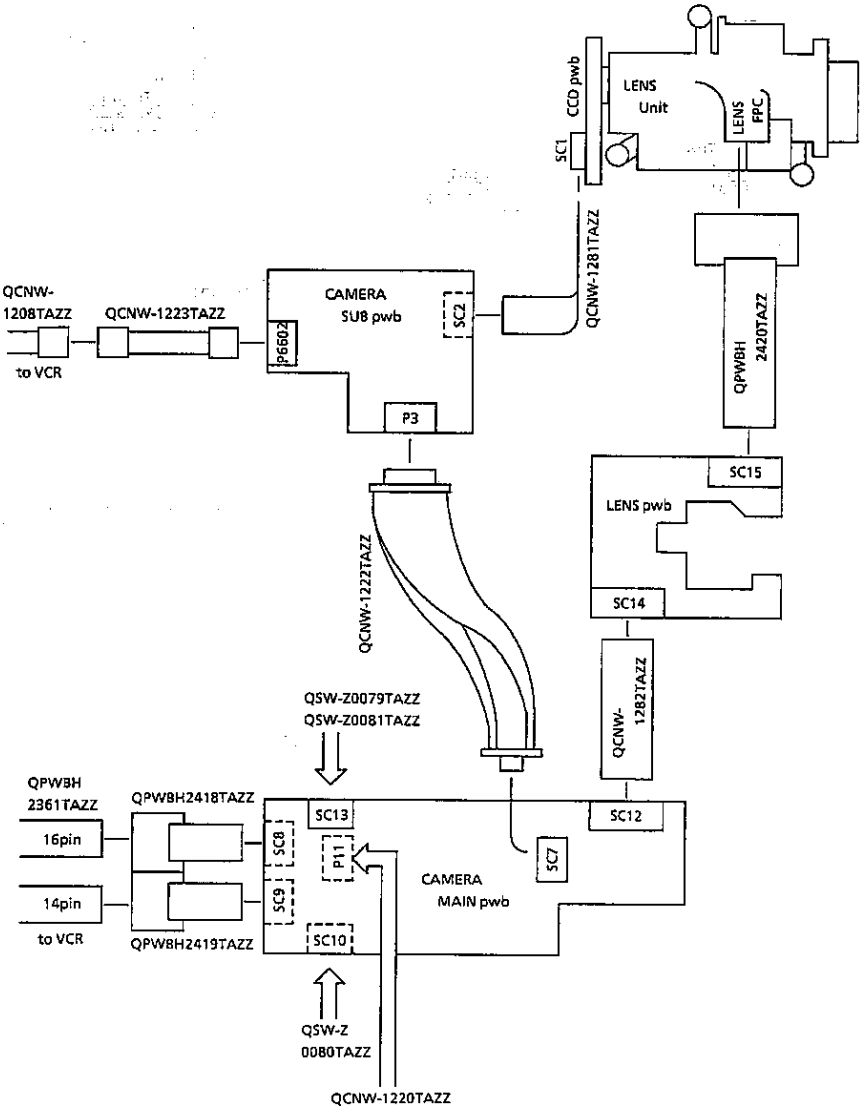
9. ADJUSTMENT OF CAMERA SECTION

9-1. SERVICING OF CAMERA SECTION

(1) Object, measuring instruments and jigs necessary for camera section servicing

- Gray scale chart
- White pattern chart
- Color bar chart
- Oscilloscope
- Digital voltmeter
- Vectorscope
- Halogen light (2 pcs.)
- Frequency counter
- Illuminometer
- Color temperature meter
- Color temperature conversion filter HOYA "LB-165"
- Color video monitor
- Video output cable
- AC adapter
- Tripod fixing jig
- Extension cable
- Adjustment mode setting jig
- Switch jig for adjustment

(2) Standard connection diagram for camera service



(3) Connection for camera adjustment

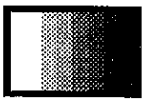
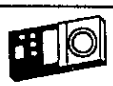
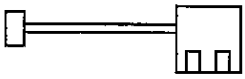
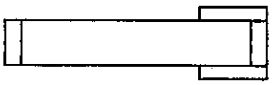
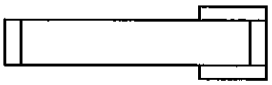
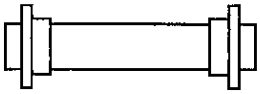
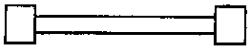
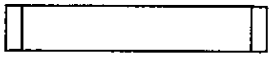
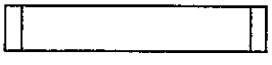
When adjusting the camera, do not use the extension cable provided in the camera section. Otherwise, white balance adjustment or carrier balance adjustment may be disturbed.

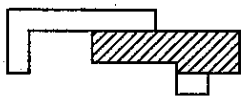
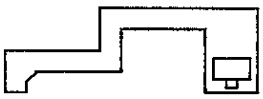
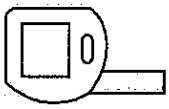
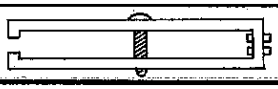
The application of extension cable for connection between camera and VCR causes no problem.

Applicable extension cables: QPWBH2418TAZZ
QPWBH2419TAZZ
QCNW-1223TAZZ

9-2. LIST OF CAMERA JIGS AND TOOLS

Note: N indicates the new jigs.

No.	Jig Name	Parts Code	Price Code	Shape	Remarks
1	Camera section jig stand	9ERJIGSTANDHL2	CG		N
2	Gray scale chart (390 × 520 mm)	JIGCHART-1	CP		
3	White pattern chart (390 × 520 mm)	JIGCHART-2	CG		
4	Color bar chart (240 × 320 mm)	JIGCHART-4	※※		
5	Illuminometer (0 to 3,000 lux)	JIGMETER-1	CT		
6	Color thermometer (1,600 to 400,000K)	JIGMETER-2	※※		
7	Color temperature conversion filter (from 3,200K to 6,800K)	JIGHOYA-LB165	BL		
8	Torque driver (1.5 kg.cm)	JIGTD1500RTDH	CB		
9	Camera adjusting switch jig (P11 ADJ connector)	QCNW-1220TAZZ	BD		N
10	Adjustment mode setting jig (Test P35 connector)	QPWBN2408TAZZ or QPWBF2450TAZZ QCNW-1292TAZZ	BY BF		N N N
11	Extension flexible PWB Camera main PWB (SC8) ⇔ video FPC	QPWBH2418TAZZ	AY		N
12	Extension flexible PWB (Camera main PWB ⇔ video FPC) (SC9)	QPWBH2419TAZZ	AY		N
13	Extension flexible PWB (Camera main PWB (SC12)⇔ lens PWB(SC14))	QPWBH2420TAZZ	BA		N
14	Extension cable wire (Camera main PWB ⇔ Camera sub PWB)(SC7 connector ⇔ P3 connector)	QCNW-1222TAZZ	BF		N
15	Extension cable wire (Camera sub PWB ⇔ audio cable) (P6602 connector)	QCNW-1223TAZZ	AM		N
16	Extension flat cable CCD PWB (SC1) ⇔ Camera sub PWB (SC2)	QCNW-1281TAZZ	AG		N
17	Extension flat cable Camera main PWB (SC12) ⇔ Lens PWB (SC14)	QCNW-1282TAZZ	AH		N

No.	Jig Name	Parts Code	Price Code	Shape	Remarks
18	Camera operation SW unit Camera main PWB (SC13)	QSW-Z0079TAZZ	AG		N
19	Power control SW unit Camera main PWB (SC10)	QSW-Z0080TAZZ	AP		N
20	Zoom SW unit 4-pin connector in camera operation SW unit	QSW-Z0081TAZZ (The domestic model is Z0084TAZZ.)	AS		N
21	FPC Insert Jig	9EQPINSET01GE	BG		

(1) Tripod fixing stand

When mounting the camera section on the tripod, use the stand (9ERJIFSTANDHL2). Attach it to the camera section lens holder as shown in Figure 9-2.

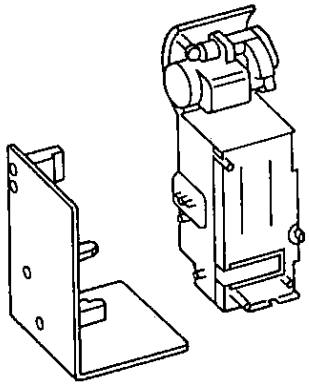


Figure 9-2

(2) Camera section adjusting switch jig (QCNW-1220TAZZ)

The jig QCNW-1220TAZZ is provided with waveform monitoring test point for camera adjustment and switches for camera signal adjustment and zoom lens system auto-focus adjustment (detailed explanation is given later).

When this jig is used, voltage applied to some test points may differ from the indicated one, but this is not trouble.

CAM4.4V TP: Actually, approx. 3.3V is applied.
-13V TP: Actually, approx. -16V is applied.

The usage of this jig is explained later.

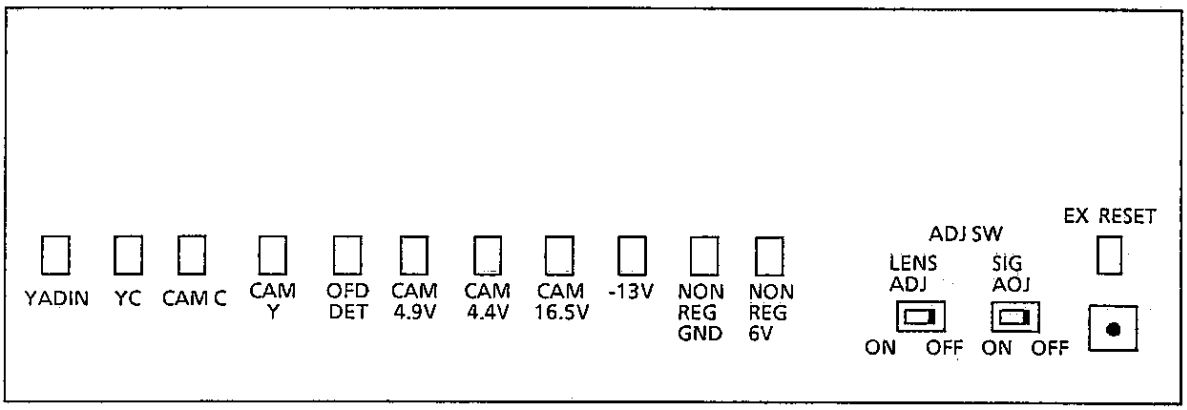


Figure 9-3

(3) Adjustment mode setting jig (QPWBN2408TAZZ or QPWBF2450TAZZ, QCNW-1292TAZZ)
The jig QPWBN2408TAZZ is designated to set the system microcomputer to the camera adjustment mode. In the camera adjustment mode the signal system of camera section can be adjusted by using the FF or REW key of VTR control section as adjustment of VCR and LCD circuit.

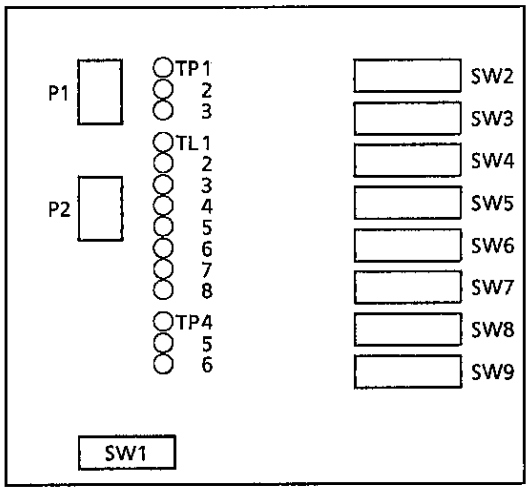
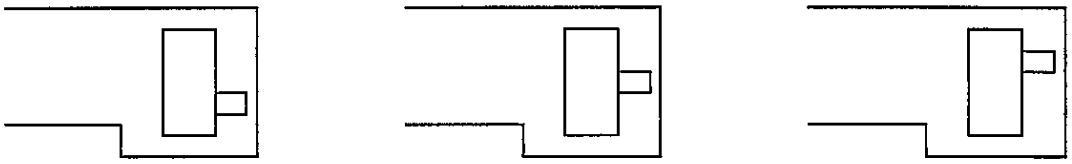


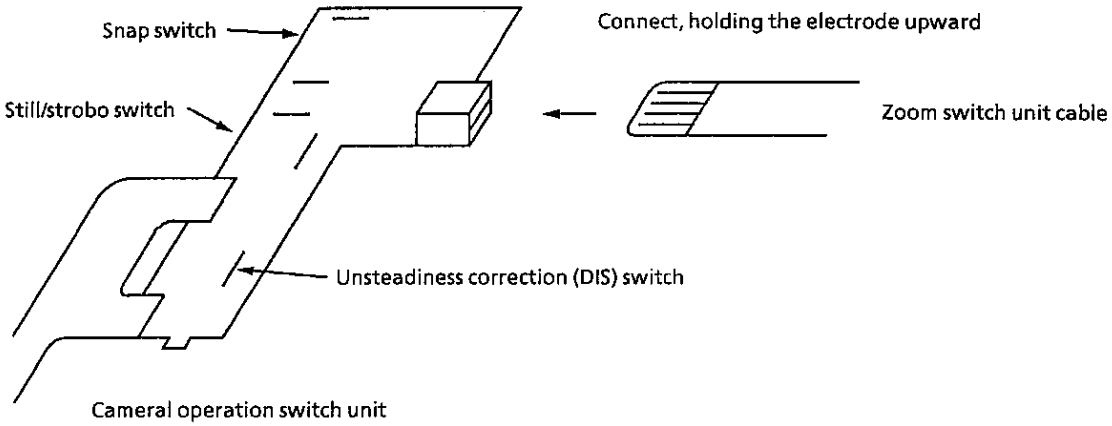
Figure 9-4

(4) Power control SW unit (QSW-Z0080TAZZ)
A slide switch is provided at the front end of unit QSW-Z0080TAZZ. To actuate the camera section, use this slide switch.



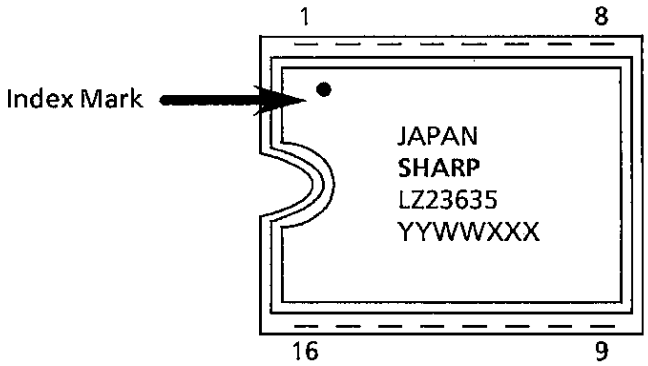
Camera ON　　Camera/VCR OFF　　VCR ON

(5) Camera operation switch unit (QSW-Z0079TAZZ) and zoom switch unit (QSW-Z0081TAZZ)
The unit QSW-Z0079TAZZ and unit QSW-Z0081TAZZ are used for camera section still, snap operation, and lens zoom operation. The zoom switch unit is connected to the 4-pin connector in the camera operation switch unit.



9-3. REPLACEMENT OF CCD SENSOR

- Before replacement
  1) The CCD image sensor is more sensitive to electrostatic breakage than C-MOS LSI. Therefore sufficient means to prevent electrostatic damage must be taken when it is replaced.
     - Ground the soldering iron.
     - Ground also the human body, using the wrist strap (through an 1 Mohm resistor).
     - Until the CCD sensor is mounted on the PWB, fit it to the conductive sponge, and short-circuit the foot lead.
  2) Take utmost care so that the surface glass of CCD sensor and optical filter are not contaminated and damaged. If any contamination is found, for example fingerprint, wipe it off with silicon paper or clean chamois skin.
  3) When replacing the CCD sensor, use the antistatic grounded soldering iron, and perform quickly soldering.
  4) Before mounting the CCD sensor, read the V-OFD voltage shown on the rear side of CCD sensor, and record it. When adjusting V-OFD voltage, refer to the item 2 of "Adjustment Procedure".



V-OFD voltage shown on the rear side of CCD sensor

Figure 8-5

- Removal of CCD

1. Unsolder the CCD sensor leads from the sensor PWB.
2. Remove the screw (1) to take out the sensor PWB.
3. Remove the two screws (2), and remove the sensor holder and CCD sensor.

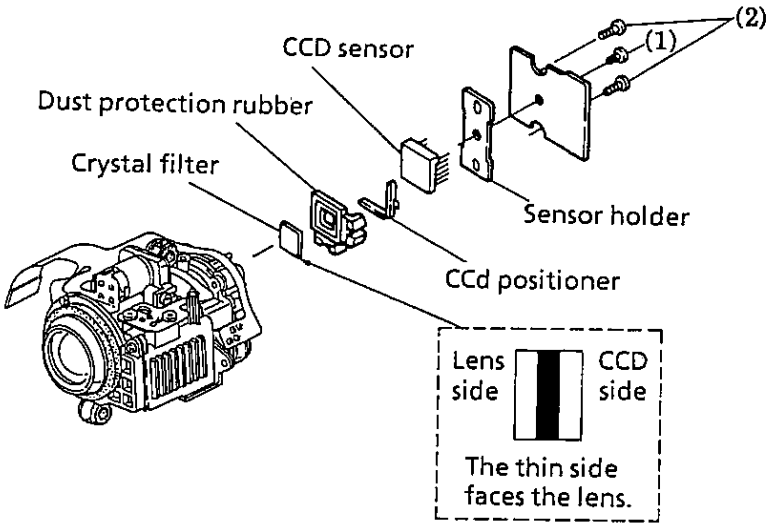
- Mounting of CCD

1. Place the lens unit upright (since the CCD sensor mount ID faces upward, care must be taken so as not to damage the front lens of lens unit), put the crystal filter first and then the dust protection rubber into the CCD holder of lens unit. Set the crystal unit with its thin side toward the lens unit.
2. Fit the CCD positioner inside the right and lower protrusions of dust protection rubber.
3. Place the CCD sensor so that the its No. 1 pin is at the upper left side (semicircular notch of side surface is at left side), and put the CCD sensor into the CCD holder. For smooth and tight fitting, press the right lower part of back of CCD sensor, and then press the left upper part.

Note: Pay attention to the direction of CCD sensor.

4. Place the sensor holder so that its two round markings be visible, and fix the sensor holder with the two screws (2).
5. Mount the sensor PWB so that the CCD sensor leads go thorough the PWB holes. Fix the PWB with the screw (1).
6. Solder the CCD sensor lead to the sensor PWB.

Note: Take care not to apply excessive heat.



9-4. ADJUSTMENT OF CAMERA SECTION

(1) Preparation and check before adjustment

1) Adjust the illumination to get an illuminance of about 3,000 lux and to ensure uniform illuminance on whole pattern surface (it is desirable to use two or more lights).

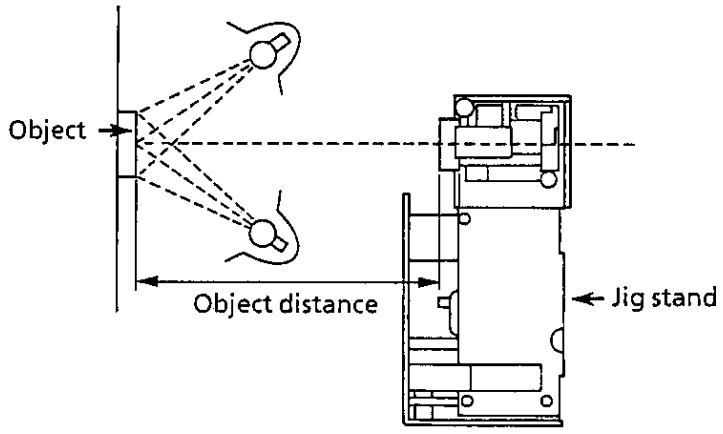


Figure 9-7

2) Use the clean test pattern free from discoloration.
3) If any trouble occurs in the electric circuit, be sure to find the defective part with the aid of measuring instrument, and repair or replace it before making an adjustment.

(2) The microcomputer is used for adjustment of camera signal system and auto-focus of zoom lens. The jig QPWBN2408TAZZ (Figure 9-6) is connected to P35 of VCR main PWB. The pertinent adjustment mode can be set with the pertinent switch.

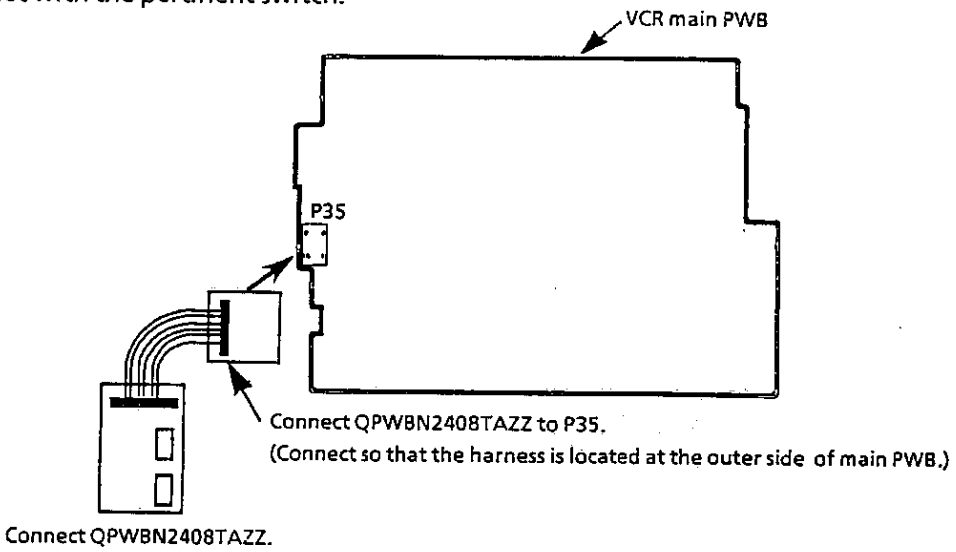

VCR main PWB
P35
Connect QPWBN2408TAZZ to P35.
(Connect so that the harness is located at the outer side of main PWB.)
Connect QPWBN2408TAZZ.

Figure 9-8

(2)-1 Method of changing the mode to the zoom lens auto-focus adjustment mode

1. Turn off the power switch of jig (QPWBN2408TAZZ).
2. Once turn off all the switches of jigs QPWBN2408TAZZ and QCNW-1220TAZZ (or ascertain that they have been turned off).
3. Turn on the LENS ADJ SW of jig QCNW-1220TAZZA.
4. Set the power switch of jig QPWBN2408TAZZA to the CAMERA mode.
5. Set the the ADJ SW of jig QPWBN2408TAZZA to CAM ADJ.
6. The auto-focus adjustment mode of lens is set.

* After the auto-focus adjustment mode has been set, make an adjustment according to the adjustment procedure stated in item 3.

* In the auto-focus adjustment mode the lens operation is disabled.

• The unit employs the microcomputer-controlled auto-focus lens.The auto-focus circuit of the unit adopts the picture processing system which is designed to perform focusing, using the effect that the high frequency component in the picture signal increases as the focusing becomes better. Moreover, so as to attain higher magnifying power with the small lens the unit employs the inner focus system which is designed to adjust the focus by moving the master lens (rear lens) forward and backward.The inner focus system ensures the full range focus from about 10 mm to infinite distance. However, the shortest distance of object at the TELE end is 1.5 m. Therefore, if the object at a distance of less than 1.5 m is shot at the TELE end, focusing is impossible. Hence, the zoom is shifted automatically to the WIDE end to the position where the focusing is obtained.

The important factors of the auto-focus system adopted in the unit are:

1) Detection of reference position of master lens
2) Detection of position of iris
3) Detection of reference position of zoom lens

These detection data are stored in the EEPROM (IC502) by microcomputer for each lens. Accordingly, the auto-focus adjustment must be performed in the following cases.

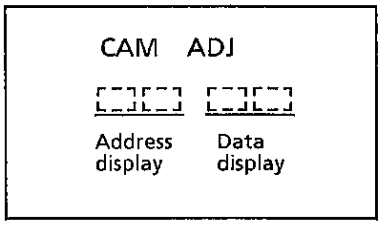
1) After replacement of lens
2) After replacement of CCD
3) After replacement of E2PROM (IC502)

(2)-2 Method of changing the mode to camera signal system adjustment mode

1. Turn off the power switch of jig QPWBN2408TAZZ.
↓
2. Set the power switch to the CAMERA mode.
↓
3. Once turn off all the switches of jigs QPWBN240TAZZ and QCNW-1220TAZZ or ascertain that they have been turn off).
↓
4. Set the manual focus mode.
↓
5. Turn on the SIG ADJ switch of jig QCNW-1220TAZZ.
↓
6. Press the RESET switch of jig QCNW-1220TAZZ.
↓
7. Set the ADJ SW of jig QPWBN2408TAZZ to CAM ADJ.
↓
8. The camera signal system adjustment mode is set.

* The adjustment characters appear and "00" blinks on the left upper part of monitor screen (or LCD screen) (see the figure below).
The white balance is fixed to the indoor mode (3200K). Thereby adjustment of signal system is enabled.

Initial screen after camera signal system adjustment mode has been set
(⌐¬ indicates blanking)



(2)-3 Method of changing to the normal mode

1. Turn off all the switches of jigs.
↓
2. Press the RESET switch of jig or once turn off the power switch, and then set the "CAMERA" mode.
↓
3. The normal mode is set.

* The operation for adjustment (method of setting the address and data in EEPROM) is described in 8-1-1 OPERATION PROCEDURE. The camera section can be adjusted by the same adjusting method and operation as those applied for the VCR and LCD circuit.
* So as to prevent the overwriting of data which do not need adjustment, transcribe the data stored before shipping into the data sheet shown below before starting the adjustment.

CAMERA SECTION ADJUSTMENT DATA SHEET

Date

Serial No.

Item	Address	A.	B.
OFD-H	7B		
OFD-L	7C		
IRIS AE	F6		
AGC AE	F7		
Y-GAIN	79		
BURST	59		
INDOOR W/B R	50		
INDOOR W/B B	51		
INDOOR C/B	78		
R-Y GAIN	53		
B-Y GAIN	54		
R-Y MAT	56		
B-Y MAT	57		
OUTDOOR W/B R	4F		
OUTDOOR W/B B	55		
OUTDOOR C/B	7F		

* After the EEPROM (IC502) is replaced, the preset data which has been set before shipping must be set again. Write the data shown below in the EEPROM.

Item	Address	Data
Low illuminance color suppression start point	3C	F0
Low illuminance color suppression end point	3D	FE
Color suppression min. level	3E	2A
Aperture color suppression level	5B	A4
DSP mode control 3	5E	20
A/F operation type selection flag	AC	80
Zoom SW TELE 1	B8	1A
Zoom SW TELE 2	B9	2E
Zoom SW TELE 3	BA	38
Zoom SW TELE 4	BB	4C
Zoom SW WIDE 4	BC	93
Zoom SW WIDE 3	BD	A7
Zoom SW WIDE 2	BE	B1
Zoom SW WIDE 1	BF	C5
AE feedback gain parameter	DB	1C
Aperture gain	0C	04
W/B high color temperature correction B	2C	O1

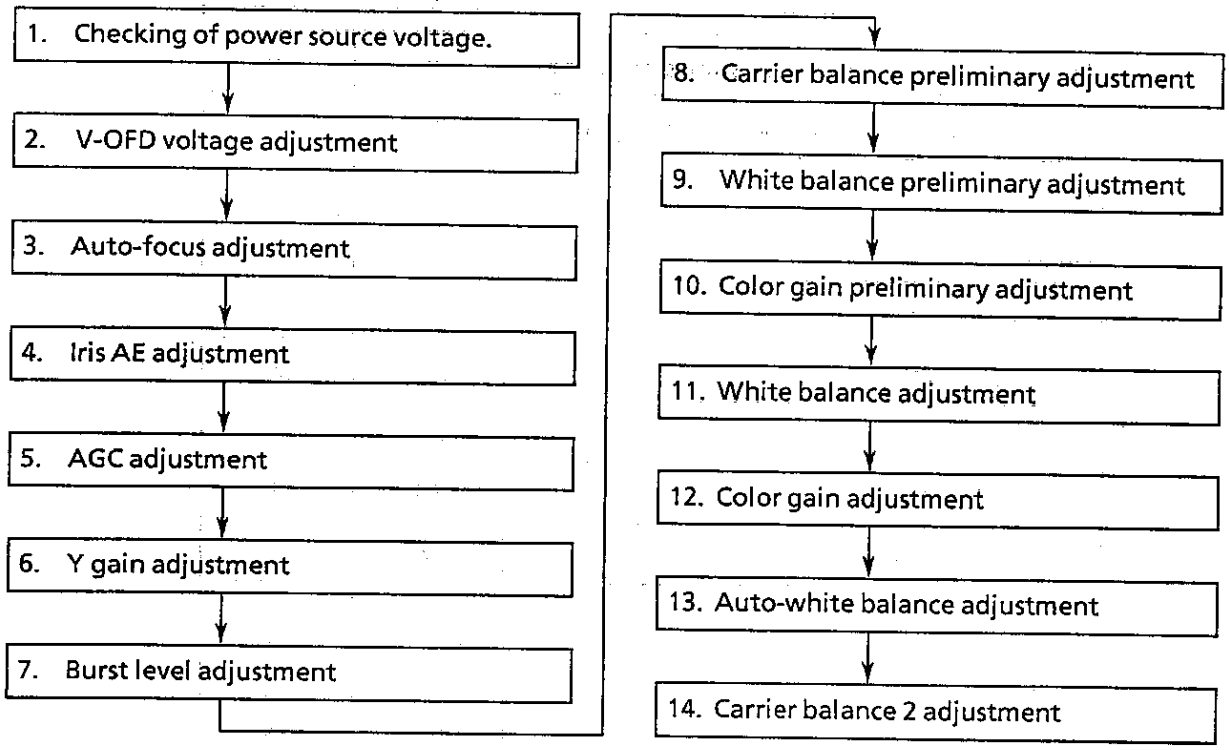
* The data of address '80' to '97' and 'EE' to 'F2' are input adjustment result of zoom lens.

* The data of address '73' and '74' are input adjustment result of AE system.

* The data of other addresses are 'FF'.

(3) Camera adjustment procedure

Below is shown the general camera adjustment procedure. In some case some steps may not be necessary.


1. Checking of power source voltage.
2. V-OFD voltage adjustment
3. Auto-focus adjustment
4. Iris AE adjustment
5. AGC adjustment
6. Y gain adjustment
7. Burst level adjustment
8. Carrier balance preliminary adjustment
9. White balance preliminary adjustment
10. Color gain preliminary adjustment
11. White balance adjustment
12. Color gain adjustment
13. Auto-white balance adjustment
14. Carrier balance 2 adjustment

9-5. ADJUSTMENT PROCEDURE

Item	Adjusting method
1. Power voltage check ●Measuring terminal : P11(6) (7) (3.3V) : P11 (8) (4.9V) : P11 (23) (16.5V) : P11 (24) (-13V) : P11 (26) (6V) ●Measuring instrument : Digital voltmeter	● Fit the camera adjusting jig to the P11 connector of camera main PWB, and check the following voltage. P11 (6) (7) 3.3 ± 0.1V P11 (8) 4.9V ± 0.05V P11 (23) 16.5V ± 0.1V P11 (24) -16 ± 1V P11 (26) 6V (NONREG 5.3 - 7V)
2. V-OFD voltage adjustment Caution: This adjustment is performed for each CCD Sensor. Accordingly, make this adjustment only when the CCD sensor is replaced. Read the indicated value of OFD voltage shown at the rear side of CCD sensor, install the sensor PWB on the CCD sensor, and then make adjustment according to the following procedure. ●Measuring terminal : P11 (9) OFD ●Address :"7B" OFD H :"7C" OFD L ●Measuring instrument : Digital voltmeter	● observe the OFD voltage with the aid of digital voltmeter, make preliminary adjustment at the address "7B", and make adjustment so as to get specified voltage of CCD sensor ± 0.1V at "7C".

3. Auto-focus adjustment

Set the auto-focus adjustment mode, and write successively the data in the address 'FE' and 'FF', so that adjustment is executed automatically. The adjustment items are as shown in the table below.

If the adjustment has been performed normally, the data 'FF' is written. It is possible to ascertain the normal adjustment by using the VCR operation keys, namely STOP key and PLAY key. Ascertain that the adjustment has been made normally before proceeding to the next adjustment.

Address	Data	Adjustment Item
FE	01	AE basic adjustment (Hall element adjustment)
FF	01	AF noise level storage
	02	Focus shield plate length adjustment
	03	Zoom shield plate length adjustment
	05	WIDE end focus ∞ position adjustment
	07	TELE end focus ∞ position adjustment

Note 1:

The adjustment of ∞ position is executed by actually picking up the image of subject. For this adjustment use the subject with clear profile. Especially, if the adjustment of TELE end focus ∞ position is made without picking up the image of remote subject, adjustment failure may occur.

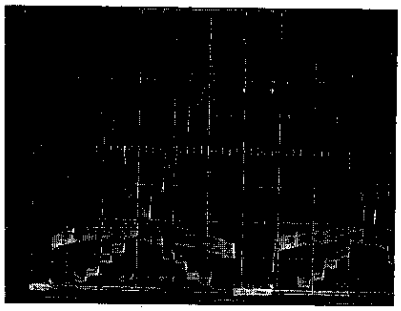
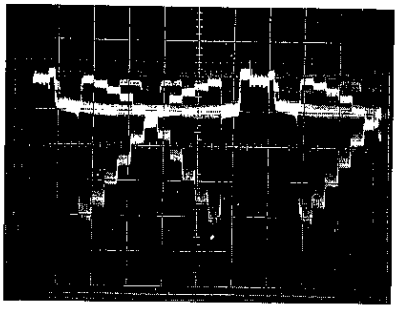
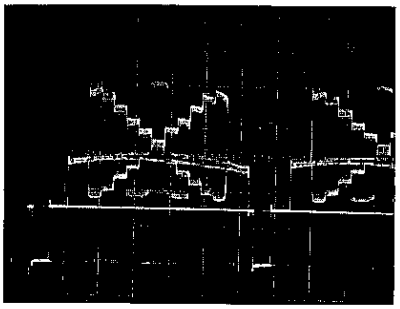
Adjustment of WIDE end focus ∞ position: 3 m or more
Adjustment of TELE end focus ∞ position: 50 m or more

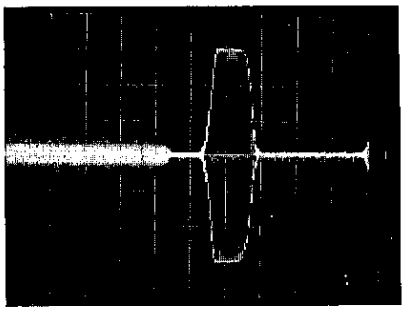
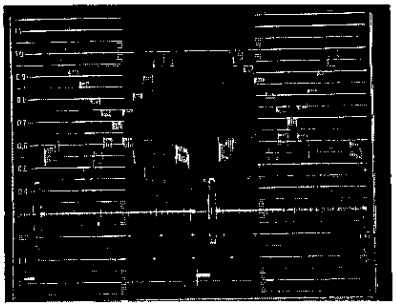
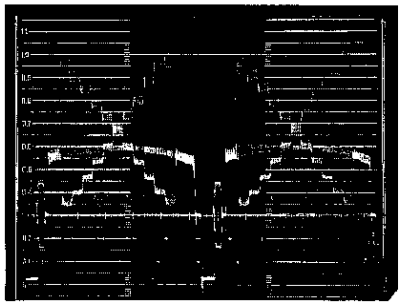
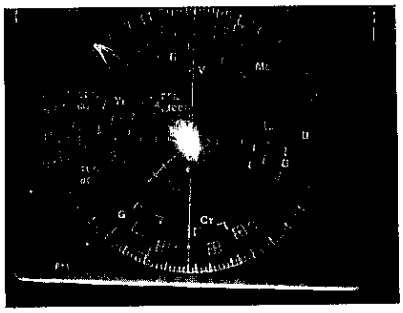
Note 2:

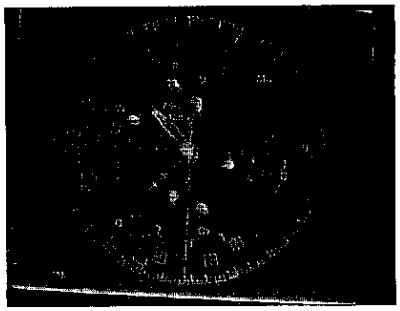
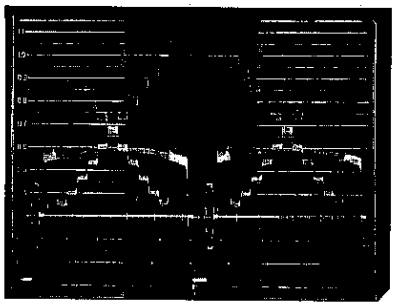
In case of ∞ position adjustment the field depth is important to ensure the adjustment accuracy. If the field depth is high, the focus becomes too stable, which may cause incorrect adjustment of ∞ position. Therefore the adjustment must be made with low field depth (with iris opened).

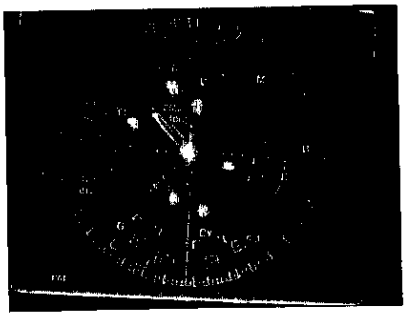
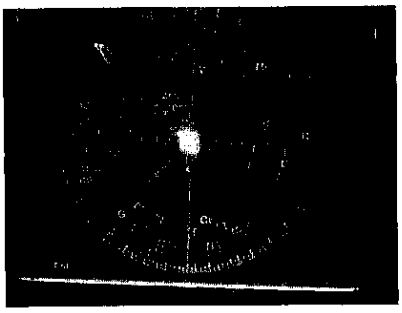
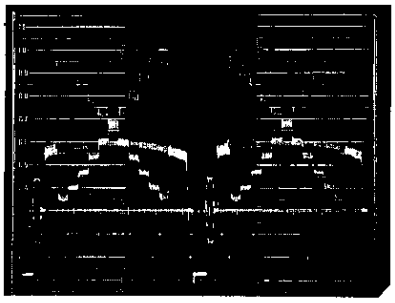
The iris can be opened with the high speed shutter.

1. Turn off the CAM ADJ switch of QPWBN2408TAZZ.
2. Use the high speed shutter by ordinary operation until the iris is opened (refer to the Operation Manual).
3. Turn on the CAM ADJ switch of QPWBN2408TAZZ.
4. Adjust the ∞ position.
5. After adjusting the ∞ position return the high speed shutter to the normal state.

Item	Adjusting method
4. Iris AE adjustment ●Measuring terminal : P11(2) YADIN ●Address : "F6" AE-CVT ●Measuring instrument :Oscilloscope (horizontal period) ●Object : Gray scale	1) Projecting the gray scale in the standard condition, observe (YADIN) with the oscilloscope, and rewrite the data of address "F6" to adjust the amplitude to 720 ± 20 mVp-p 
5. AGC1 adjustment ●Measuring terminal : P11(3)Yc ●Address : "F7" AGC1 ●Measuring instrument : Oscilloscope (horizontal period) ●Object : Gray scale	1) Projecting the gray scale in the standard condition, observe (Yc) with the oscilloscope, and rewrite data of address "F7" to adjust the amplitude to -200 ± 10 mVp-p 
6. YGAIN adjustment ●Measuring terminal : P11(B)CAM-Y ●address : "79"YGAIN ●Measuring instrument : Oscilloscope (horizontal period) ●Object : Gray scale	1) Projecting the gray scale in the standard condition, observe (CAM-Y) with the oscilloscope, and rewrite the data of address "79" to adjust the SYNC level to 300 ± 10 mVp-p Note: At this time ascertain that the Y level of CAM-Y is 700 ± 15 mVp-p If not, check the data of ● address : 13 YENC-STUP : 14 YENC-BLK Ascertain also the adjustment of items 3 and 4. 

Item	Adjusting method
7. Burst level adjustment ●Measuring terminal : P11(10)CAM-C ●Address : "59" BFMX-LEVL ●Measuring instrument : Oscilloscope (horizontal period)	1) Observe (CAM-C) with the oscilloscope, and rewrite the data of address "59" to set the burst level to 286 ± 20 mVp-p 300 ± 20 mVp-p 
8. Carrier balance preliminary adjustment ●Measuring terminal :EE output ●Address : "78" VRBS1 ●Measuring instrument :Waveform monitor	1) Projecting the gray scale in the standard condition, observe the waveform monitor, and make an adjustment so as to minimize color drop-out of black of gray scale 1 gradation.   Improper adjustment Proper adjustment
9. White balance preliminary adjustment ●Measuring terminal : EE output ●Address : "50" INDOOR W/B R : "51" INDOOR W/B B ●Measuring instrument : Vectorscope ●Object : Gray scale	1) Projecting the gray scale in the standard condition, observe the vectorscope, rewrite the data of address "50" and "51" to make a setting so that bright spot is located in the position of burst ratio R-Y 0 ± 5% B-Y 0 ± 5% 

Item	Adjusting method
10. Color gain preliminary adjustment ●Measuring terminal : EE output ●Address : "53" CGIN RYG : "54" CGIN RYG : "56" CMAT RYG : "57" CMAT BYG ●Measuring instrument : Vectorscope ●Object : Color bar chart	1) Projecting the color bar in the standard condition, observe the vectorscope, and rewrite the data of address "53", "54", "56", and "57" to make a setting so that the red and blue bright spots are located as follows. (The gain of vectorscope must be set on the point of 75% amplitude on the B-Y axis.)  Red amplitude : 1.35 ± 0.1 times (burst ratio) Blue amplitude : 0.90 ± 0.1 times (burst ratio) Red phase : 108* ± 2* Blue phase : 344* ± 3*
11. White balance adjustment Carrier balance 1 ●Measuring terminal : EE output ●Address : "50" INDOOR W/B R : "52" INDOOR W/B B : "78" VRBS 1 ●Measuring instrument : Vectorscope : Waveform monitor ●Object : Gray scale	1) Projecting the gray scale in the standard condition, observe the vectorscope, rewrite the data of address "50" and "51" to make a setting so that bright spot is located in the position of burst ratio R-Y 0 ± 5% B-Y 0 ± 5% 2) Observe the waveform monitor in the same projecting condition, rewrite the data of address "78", and make an adjustment so that the color drop-out of gray scale 1 gradation is minimized. 0 ± 3% (burst ratio) 

Item	Adjusting method
12. Color gain adjustment ●Measuring terminal : EE output ●Address : "53" CGIN RYG : "54" CGIN BYG : "56" CGIN RYG : "57" CGIN RYG ●Measuring instrument : Vectorscope ●Object : Color bar chart	1) Projecting the color bar in the standard condition, observe the vectorscope, rewrite the data of address "53", "54", "56" and "57", and make a setting so that the red and blue bright spot is located in the following position. (The gain of vectorscope must be set on the point of 75% amplitude on the B-Y axis.)  Red amplitude : 1.35 ± 0.1 times (burst ratio) Blue amplitude : 0.90 ± 0.1 times (burst ratio) Red phase : 108* ± 2* Blue phase : 344* ± 3*
13. Auto-white balance adjustment ●Measuring terminal :EE output ●Address : "4F" OUTDOOR R : "55" OUTDOOR B ●Measuring instrument : Vectorscope ●Object : Gray scale	1) Attach the color temperature conversion filter (LB165) to the lens. 2) Projecting the gray scale in the standard condition, observe the vectorscope, and make a setting so that the bright spot is located in the position of R-Y +3 ± 5% B-Y −3 ± 5% 
14. Carrier balance 2 adjustment ●Measuring terminal : EE output ●Address : "7F" VRBS 2 ●Measuring instrument : Waveform monitor ●Object : Gray scale	1) Observe the waveform monitor in the state described in item 12 above, rewrite the data of address "7F" to minimize the color drop-out of gray scale 1 gradation. 0 ± 3% (burst ratio) 

Repeat the adjustments described in items 13 and 14 until the specified values are obtained.

9-6. DETAILED EXPLANATION OF AF SYSTEM ADJUSTMENT

1. ADJUSTMENT OF AF NOISE LEVEL STORAGE

Outline :

An adjustment is made so that the noise level of each focus data obtained during auto-focus operation is stored in the memory. The auto-focus is set based on the stored data.

Adjustment :

While the iris is closed completely, the noise level in AF data is stored in AGC cut, intermediate gain and maximum gain states.

Operation procedure :

(1) Widen the AF evaluation area, and completely close the iris.
(2) Set the AGC gain to minimum, and wait for several seconds.
(3) Write the narrow band data in the address 88H to 89H and the wide band data in the address 8EH to 8FH.
(4) Set the AGC gain to the intermediate gain, and wait for several seconds.
(5) Write the narrow band data in the address 8AH to 8BH and the wide band data in the address 90H to 91H.
(6) Set the AGC gain to maximum, and wait for several seconds.
(7) Write the narrow band data in the address 8CH to 8DH and the wide band data in the address 92H to 93H.
(8) Restore the initial state of iris.

2. Adjustment of photo interrupter shield plate length of focusing lens

Outline :

An adjustment is made to determine the length of shield plate which is taken as standard for master lens positioning. The step error correction of master lens is performed based on the stored data.

Adjustment :

The length of shield plate is stored in the memory as the number of focus steps.

Operation procedure :

At first, move fully the master lens at the CCD side, and detect the CCD side shield plate edge. After the CCD side edge is detected, move the master lens to the front side, and find the opposite edge. After the front side edge is detected, count the number of steps to know the width of shield plate, and write it in the address 80H to 81H.

3. Adjustment of photo interrupter shield plate lengh of zooming lens.

Outline :

An adjustment is made to determine the length of shield plate which is taken as standard for zooming lens positioning.

Adjustment :

The length of shield plate is stored in the memory as the number of zoom steps.

Operation procedure :

At first, move fully the zooming lens at the front side, and detect the front side shield plate edge. After the front side edge is detected, move the zooming lens to the CCD side, and find the opposite edge. After the CCD side edge is detected, count the number of steps to know the width of shield plate, and write it in the address 82H to 83H.

4. Adjustment of WIDE end ∞ position storage

Outline :

An adjustment is made to detect the position of ∞ at the WIDE end by actuating the auto-focus and to store it in the memory. Calculation of zoom tracking curves is performed based on the stored data.

Adjustment :

The ∞ position at the WIDE end is stored as the number of steps from the CCD side shield plate edge.

Operation procedure :

At first, move the zoom lens by the WIDE end, and set the focus operation speed to "medium speed", and actuate the auto-focus. After proper focus position has been obtained, store the focus position in the address 82H to 83H. After that stop again the auto-focus to end.

5. Adjustment of TELE end ∞ position

Outline :

An adjustment is made to detect the ∞ position at the TELE end by actuating the auto-focus and to store it in the memory. Correction of zoom tracking curve with respect to deviation of front lens is performed based on the stored data.

Adjustment :

The ∞ position at the TELE end is stored as the number of steps from the CCD side shield palate edge. The position of TELE end 1m based on the TELE end ∞ and the number of steps of maximum focus moving range are stored in the memory.

Operation procedure :

At first, move the zoom lens by the TELE end, and set the focus operation speed to "medium speed", and actuate the auto-focus. After proper focus is obtained store the focus position in the address 84H to 85H. Then, stop again the auto-focus. Taking the TELE end ∞ as a standard, store the step position of TELE end 1m in the address AAH to A3H, and store the maximum step position of focuses moving range for the whole zoom area in the address ACH to ADH. Then, end.

AE BASIC ADJUSTMENT

For this adjustment the camera microcomputer itself executes auto-tuning.

This adjustment is started when the data '01'H is written in the address 'FE'H of EEPROM in the auto-focus adjustment mode. If 'FF'H is returned, the adjustment is completed. If other signal is returned, an error occurs.

HOLE OFFSET ADJUSTMENT

Make an adjustment so that the specified Hall element output voltage is obtained while the iris is opened.

IRIS OFFSET ADJUSTMENT

Gradually close the fully opened iris, and store the iris offset value at which the specified Hall element output voltage is obtained.

IRIS CLOSE ADJUSTMENT

Gradually lower the iris voltage where the iris is closed, and adjust the voltage at which the iris begins to open.

BASIC AE ADJUSTMENT ERRORS

If data '01'H is written in the address FEH but it fails to end in 'FF'H, the following error exists.

11H HOLE OFFSET ERROR

When the hole offset voltage (approx. 3V) is output for the first time with the iris opened, the hole voltage must be higher than approx. 3.1V. However, the obtained voltage was lower than the specified value.

--> Iris failure, hole input/output circuit failure

12H HOLE OFFSET ADJUSTMENT ERROR

When the hole offset voltage was reduced gradually from approx. 3V to set the hole voltage to approx. 3.1V, it exceeded 3.1V.

--> Hole input/output circuit failure

13H HOLE OFFSET ADJUSTMENT ERROR

When the hole offset voltage was reduced gradually from approx. 3V to set the hole voltage to approx. 3.1V, setting was disabled although the hole offset voltage was 0V.

--> Hole input/output circuit failure

14H IRIS OFFSET ADJUSTMENT ERROR

When the iris output voltage is approx. 0.3V with the iris opened, and the iris offset voltage of approx. 2V is output, the hole voltage must be higher than approx. 3.1V. However, the obtained voltage was lower than the specified value.

--> Iris offset circuit failure

15H IRIS OFFSET ADJUSTMENT ERROR

When the iris offset voltage was raised gradually from approx. 0.3V to set the hole voltage to approx. 3.1V, it exceeded approx. 3.1V.

--> Iris offset circuit failure

16H IRIS OFFSET ADJUSTMENT ERROR

When the iris offset voltage was raised gradually from approx. 0.3V to set the hole voltage to approx. 3.1V, setting was disabled although the iris offset voltage was 5V.

--> Iris offset circuit failure

17H IRIS CLOSE ADJUSTMENT ERROR

When the iris output voltage of approx. 4.5V is output with the iris closed, the hole voltage must be lower than approx. 2.8V. However, the obtained hole voltage was higher than the specified value.

--> Iris failure, iris circuit failure

18H IRIS CLOSE ADJUSTMENT ERROR

When the iris output voltage of approx. 4.5V is output and it is lowered gradually, the hole voltage must be lower than approx. 2.8V. However, the obtained voltage was higher than the specified value.

--> Iris failure, iris circuit failure

19H IRIS CLOSE ADJUSTMENT ERROR

When the iris output voltage was lowered gradually to check hole voltage change point, the hole voltage did not change although the iris output voltage became 0V.

1AH IRIS CLOSE ADJUSTMENT ERROR

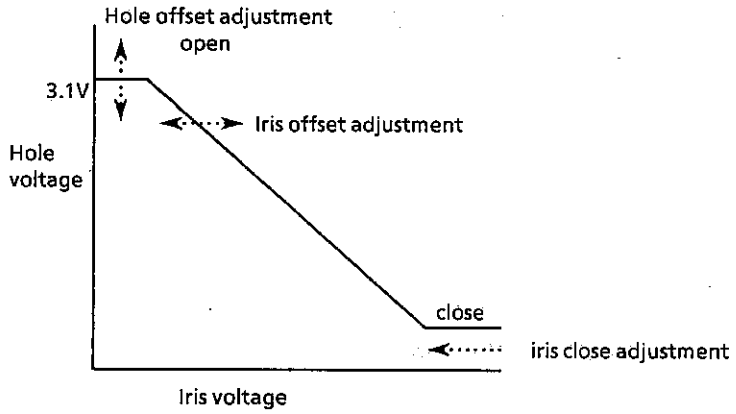
When the iris output voltage was lowered gradually to check the hole voltage change point, the hole output voltage range was too wide although the iris output voltage was proper.

--> Iris failure or significant hole voltage noise

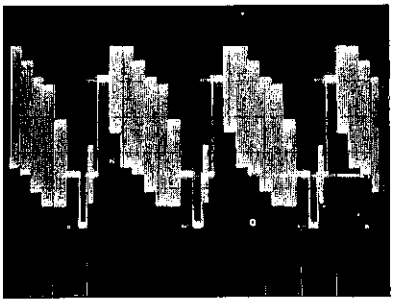
1BH HOLE VOLTAGE ERROR

Hole voltage is not stable.

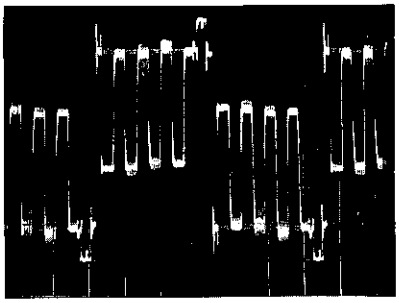
--> Iris failure, hole circuit failure



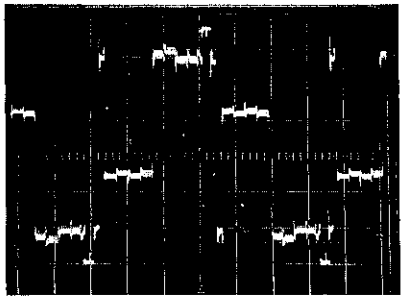
10. LCD DISPLAY



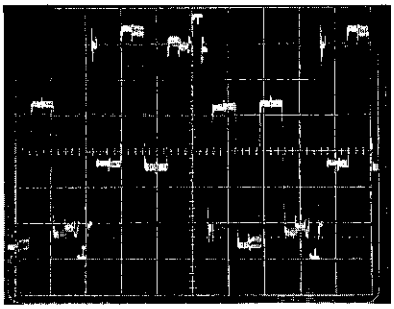
V : 1Vp-p
TP800
LCD video
200mV, 20µsec/div



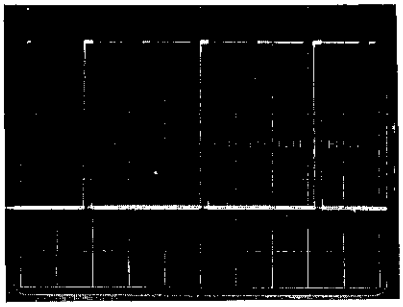
V : 4.8Vp-p (Pedestal - Pedestal)
TP802
B output (VB)
1V, 20µsec/div



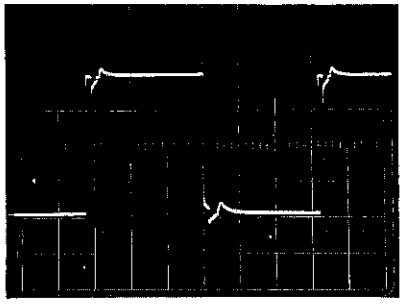
V : 4.6Vp-p (Pedestal - Pedestal)
TP803
G output (VG)
1V, 20µsec/div



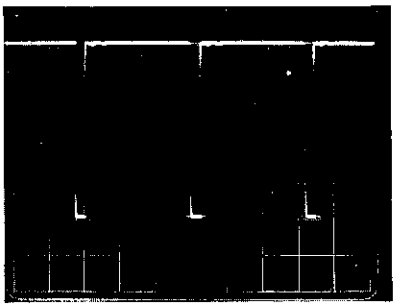
V : 4.9Vp-p (Pedestal - Pedestal)
TP804
R output (VR)
1V, 20µsec/div



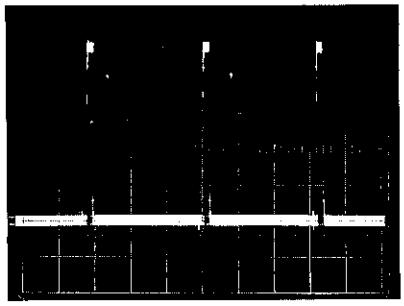
V : 4.6Vp-p
TP805
H SYNC
1V, 20µsec/div



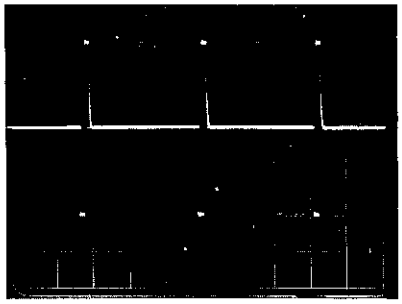
V : 4Vp-p
TP806
Common voltage
1V, 20µsec/div



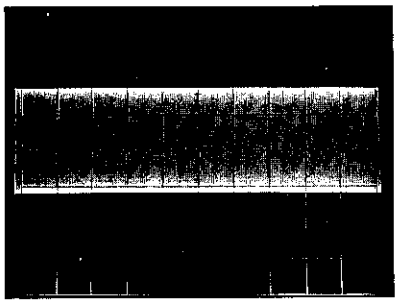
V : 5Vp-p
TP807
HD
1V, 20µsec/div



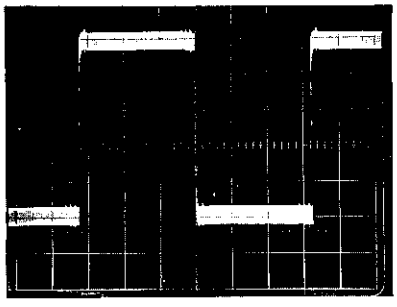
V : 5Vp-p
TP808
SPD (start signal for source driver)
1V, 20µsec/div



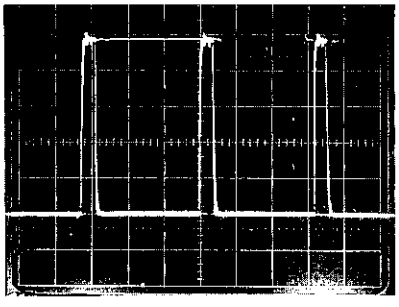
V : 4.8Vp-p
TP809
PDP
1V, 20µsec/div



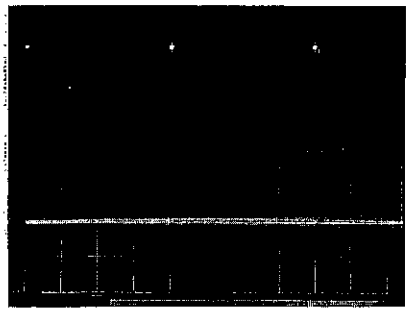
V : 3Vp-p
CLD
(clock signal for source driver)
1V, 20µsec/div



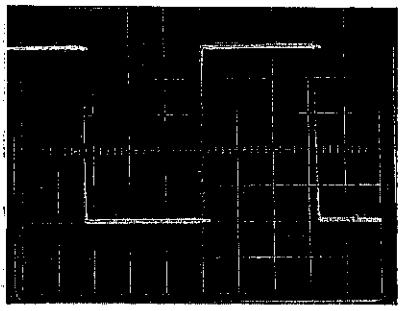
V : 5Vp-p
RES
(Color switching signal for source driver)
1V, 20µsec/div



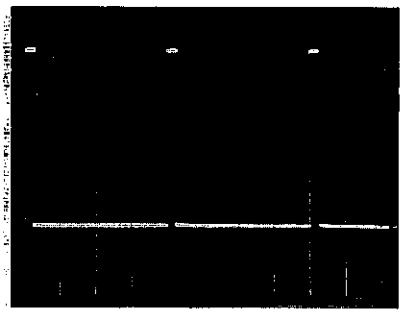
V : 4.9Vp-p
CLS
(clock signal for gate driver)
1V, 20µsec/div



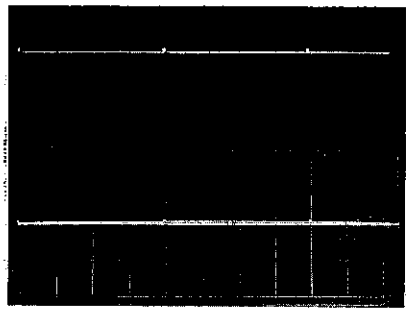
V : 4.8Vp-p
SPS
(start signal for gate driver)
1V, 5msec/div



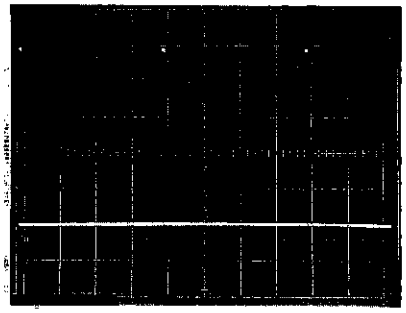
V : 4.9Vp-p
TL837
FRP (inversion signal)
1V, 20µsec/div



V : 4.9Vp-p
IC801 5 pin
VIN
1V, 5msec/div



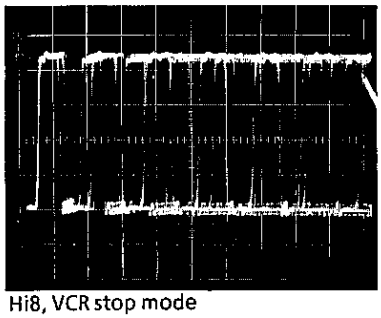
V : 4.8Vp-p
IC801 3 pin
C SYNC
1V, 5msec/div



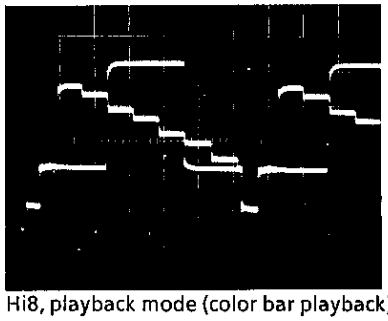
V : 4.8Vp-p
IC801, 1 pin
C VIN
1V, 5msec/div

WAVEFORMS OF SIGNAL PROCESSING SYSTEM

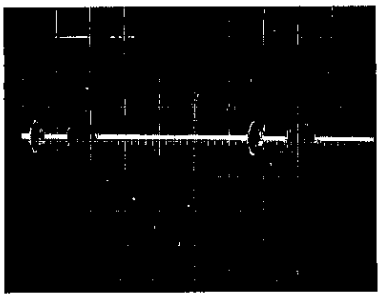
Y/C-C CIRCUIT



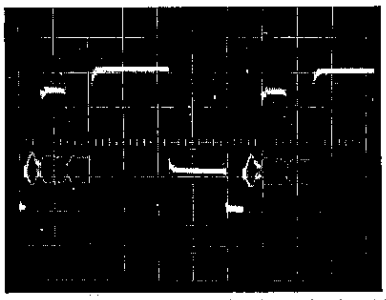
Hi8, VCR stop mode
(Color bar input)
(Applied tape: Hi8MP)
TP404, record FMY signal
100 mV, 0.1 µsec/div



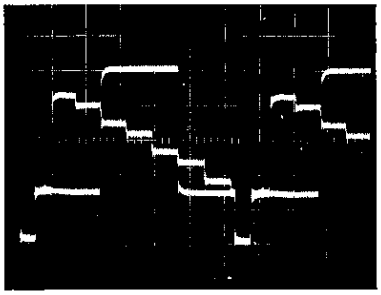
Hi8, playback mode (color bar playback)
(Applied tape: Hi8MP)
TP1403, playback S output (Y signal)
500 mV, 10 µsec/div



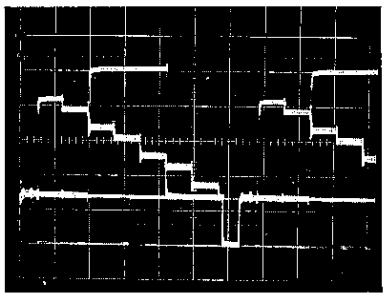
Hi8, playback mode (color bar playback)
(Applied tape: Hi8MP)
TP1404, playback S output (C signal)
500 mV, 10 µsec/div



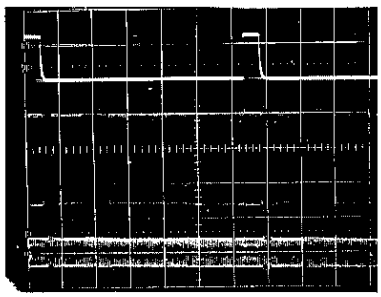
Hi8, playback mode (color bar playback)
(Applied tape: Hi8MP)
TP406, 1HCCD input signal)
100 mV, 10 µsec/div



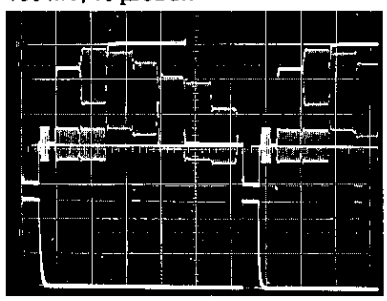
Hi8, playback mode (color bar playback)
(Applied tape: Hi8MP)
TP406, 1HCCD input signal)
100 mV, 10 µsec/div



Hi8, VCR stop mode
(Color bar input)
(Applied tape: Hi8MP)
TP403, preemphasis input
Y signal (same as TP402)
100 mV, 10 µsec/div

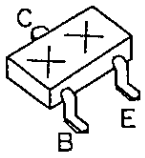


Record mode (color bar input)
(Applied tape: Hi8MP)
Upper: IC401, 24pin (Y/C circuit)
C-SYNC signal, 2V, 10 µsec/div
Middle: P35 connector 1 pin FM record current
100 mV/10 µsec/div
Lower: P35 connector 26 pin FM record current
100 mV/10 µsec/div

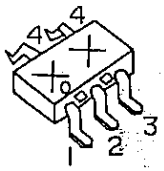


Hi8, VCR stop mode
(Color bar input)
(Applied tape: Hi8MP)
Upper: 1 ch TP1401 Video input signal
500 mV/div
10 µsec/div
Lower: 2 ch IC401, 24pin C-SYNC signal
1V/div
10 µsec/div

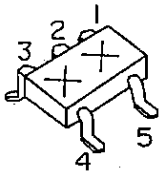
11. SHAPE OF SEMICONDUCTORS



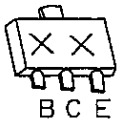
2SA1037
Q1302, 1304
2SA1162Y
2SA1298Y
Q905
2SA1577R
Q421
2SA1774F
Q402, 408, 409, 416, 419, 435, 436, 437, 441, 1401, 1405, 1710, 2401, 2420, 3405, 3410, 3445, 3448
2SB12956
Q906, 6402
2SB1462
Q13, 151
2SC3931C
Q308, 309, 403, 424, 3401, 3402, 3408, 3409, 3442, 3443, 3444, 3447
2SC4116Y
Q909
2SC4555
Q410, 411, 422
2SC4617B
Q311, 401, 414, 420, 426, 432, 433, 434, 440, 442, 443, 444, 445, 446, 448, 449, 450, 1403, 2402, 2404, 2405, 2409, 2418, 3404, 3406, 3407, 3416
2SC4627
Q2
2SD1819A
Q6601, 6611, 6622
2SD2216
Q11, 152, 244, 556, 558, 810, 904, 911, 914
2SD602A
Q439
BC847B1F
DTA114EE
Q301
DTA144EE
Q405, 407, 811, 1303, 1709, 2416, 3441, 3446
DTC114EE
Q415
DTC144EE
Q406, 412, 413, 1301, 1404, 2413, 2417, 3411
DTC144EU
Q425
DTC323
Q602, 603, 6405, 6406
RN2104
Q447
UN5111
Q702
UN5113
Q605, 609
UN9213
Q606, 6401, 6403



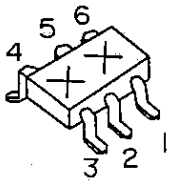
FP101
Q809, 901, 902
FP103
Q915



UMA2
Q417, 431
UMA7
Q552
UMG2
Q306, 418, 2419, 6404
UMG8
Q554
XP1113
Q312, 313
XP1213
Q551
XP1501
Q12
NJM2107F
IC602, 803
TA75S01F
IC6602
TC7S04F
IC1708
TC7S08F
IC706
TC7S32F
IC705

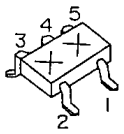


2SB1121T
Q908, 1708
2SB1132Q
Q557
2SB1302S
Q903, 907, 910
2SD874AS
Q555

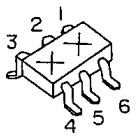


RN4604
Q601

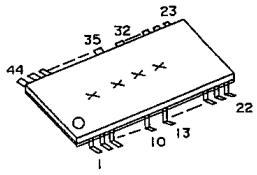
VL-H400S/H/X
VL-H9E



FMC5
Q701, 703
FMS1
Q604
FMY1
Q917

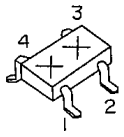


XP4113
Q913
XP4213
Q912
XP4601
Q14, 203, 241, 242, 243, 423, 801, 803, 804, 808
XP6401
Q314, 315, 562
XP6501
Q302, 303, 304, 305, 310, 404, 427, 608, 1701, 3412, 3440, 6621

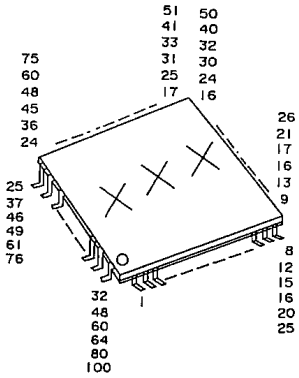


MB811501
IC273, 274, 275

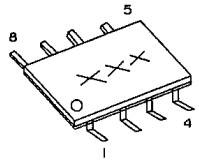
NJM79L09
IC13



PST592EM
IC504

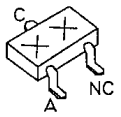


IX0135TA	**IX2089CE**	**HA118276**
IX0137TA	IC801	IC603
IC231	**CA1207AR**	**IR3P90Y**
IX0138TA	IC401	IC800
IX0163TA	**CA1390AR**	**L7A0932**
IC272	IC101	IC276
IX0170TA	**CA1507BR**	**LR38167**
IC201	IC152	IC271
IX0177TA	**CXA1208R**	**LZ95D43M**
IC501	IC2401	IC11
IX0178TA	**CXA1399Q**	**MB3785V**
IC1701	IC151	IC900
IX1003GE	**CXD1177Q**	**MC13400F**
IX1004GE	IC241	IC1401
IX1010GE	**HA118167**	**XR10813**
IC701	IC301	IC1702

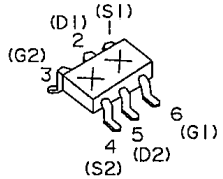


BA7655F	**NJM2903M**
IC407	IC805
BA9701F	**NJM2904M**
IC901	IC804
CAT35C2K	**NJM4560M**
IC502	IC6401
CXA1211M	**S8420HF**
IC3402	IC702
CXL5504M	**CA93C46J**
M5222FP	IC703
IC6402	**TC4W53F**
NJM2073M	IC406
IC6403	**TC4W66F**
NJM2244M	IC601, 554
IC1402	

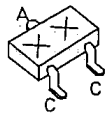
2SK160
Q1
2SK94



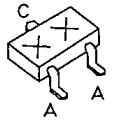
)148TA
)151TA
EX0226CE
D805
EX0626CE
D802
EX0227CE
EX0231CE
MA132K
D12, 13, 15, 16, 19, 804, 808, 817, 2403, 6621



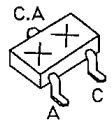
FC13
Q6623



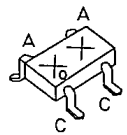
MA132WA
D11, 410, 501



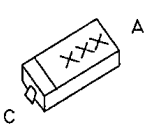
DAN202U
D701, 702, 1701, 1702, 1703
HVM17
D402, 816
MA132WK
D904, 1401, 1406, 2401



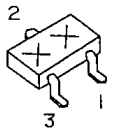
MA133
D14, 401, 703, 811, 1402, 1403, 1405
MA147
D809, 3401, 3403



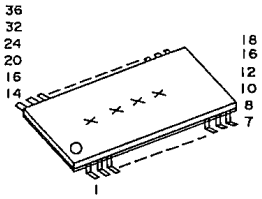
DA227
D901, 902



MA335Q
D806
SFPB52
D900



PST529DM
IC806

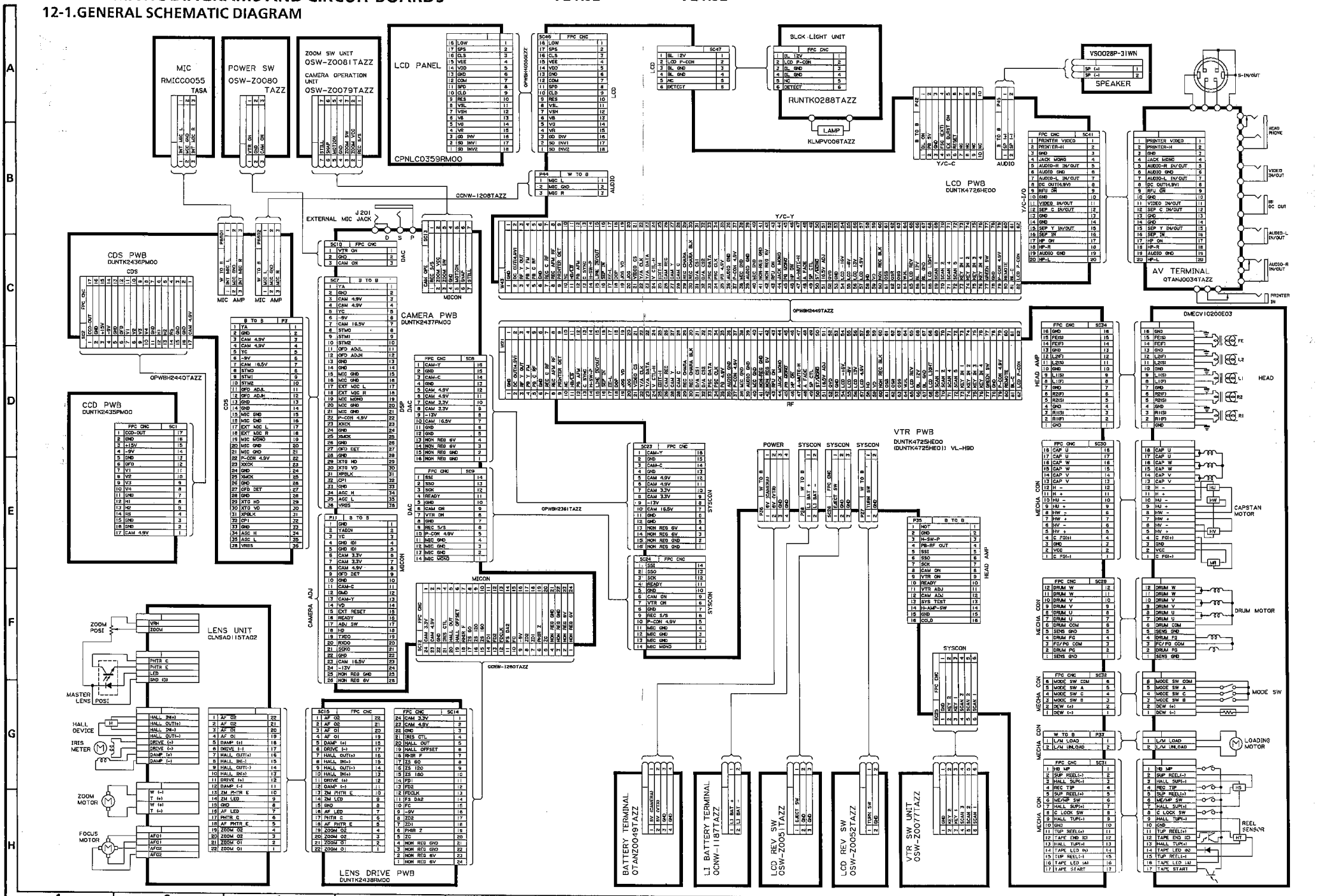


IX0168TA	**LB1881V**
IC704	IC1705
IX1021GE	**LB8111V**
IX1426CE	IC1703
IC202	**M52083FP**
CXA1452N	IC3401
IC408	**M62352GP**
CXD1250N	IC5401, 5403
IC12	**M62353GP**
CXL5502M	IC5402
IC402, 403	**MB8346BV**
LA7470V	IC503
IC6601	**NJM2902V**
LB1841V	IC551, 553, 1707
IC1704	**MM1107**
LB1880M	IC552
IC1706	

VL-H400S/H/X
VL-H9E

12. SCHEMATIC DIAGRAMS AND CIRCUIT BOARDS

12-1.GENERAL SCHEMATIC DIAGRAM

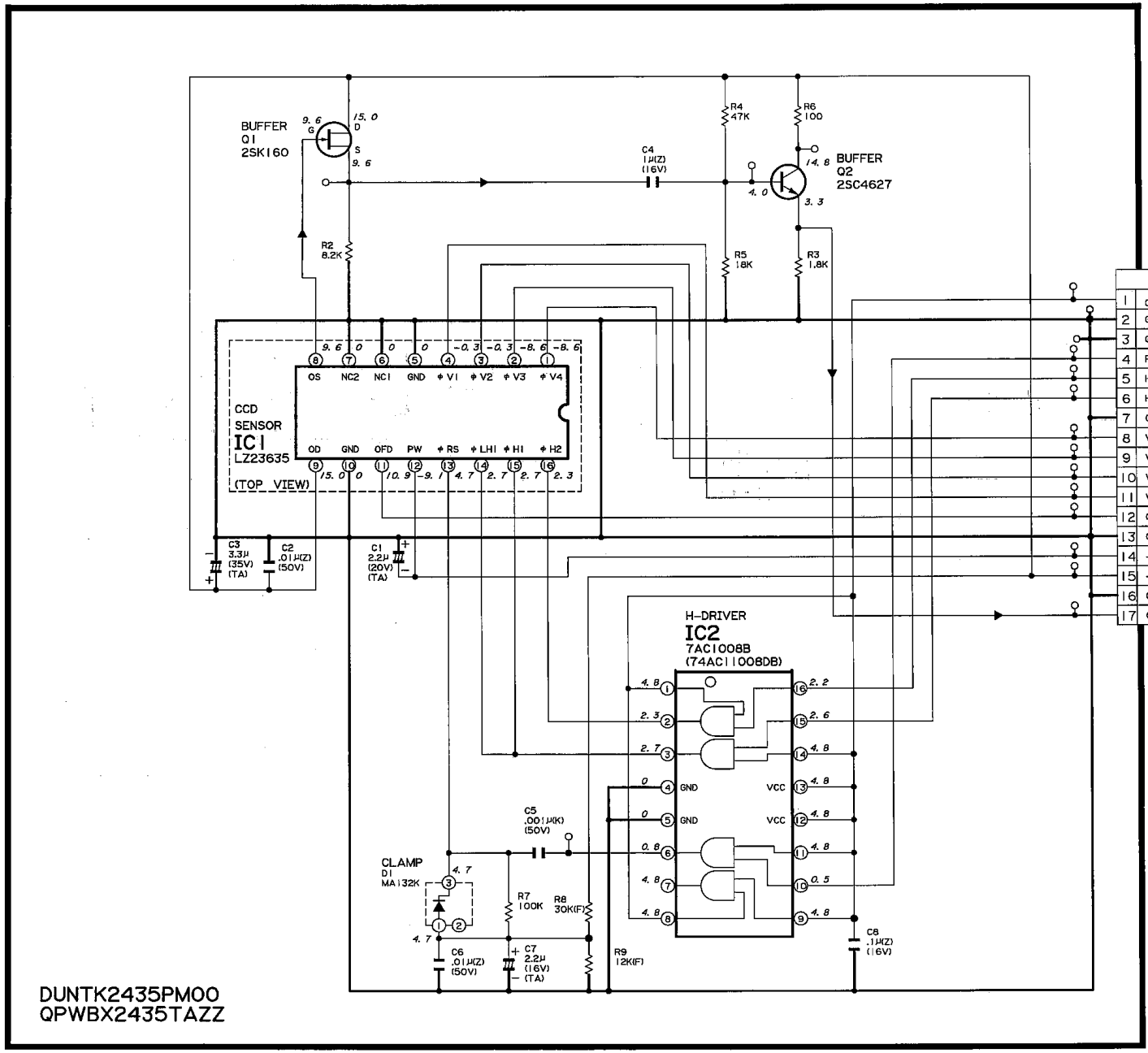


VL-H400S/H/X
VL-H9E

12-2.CCD CIRCUIT BASIC SCHEMATIC DIAGRAM

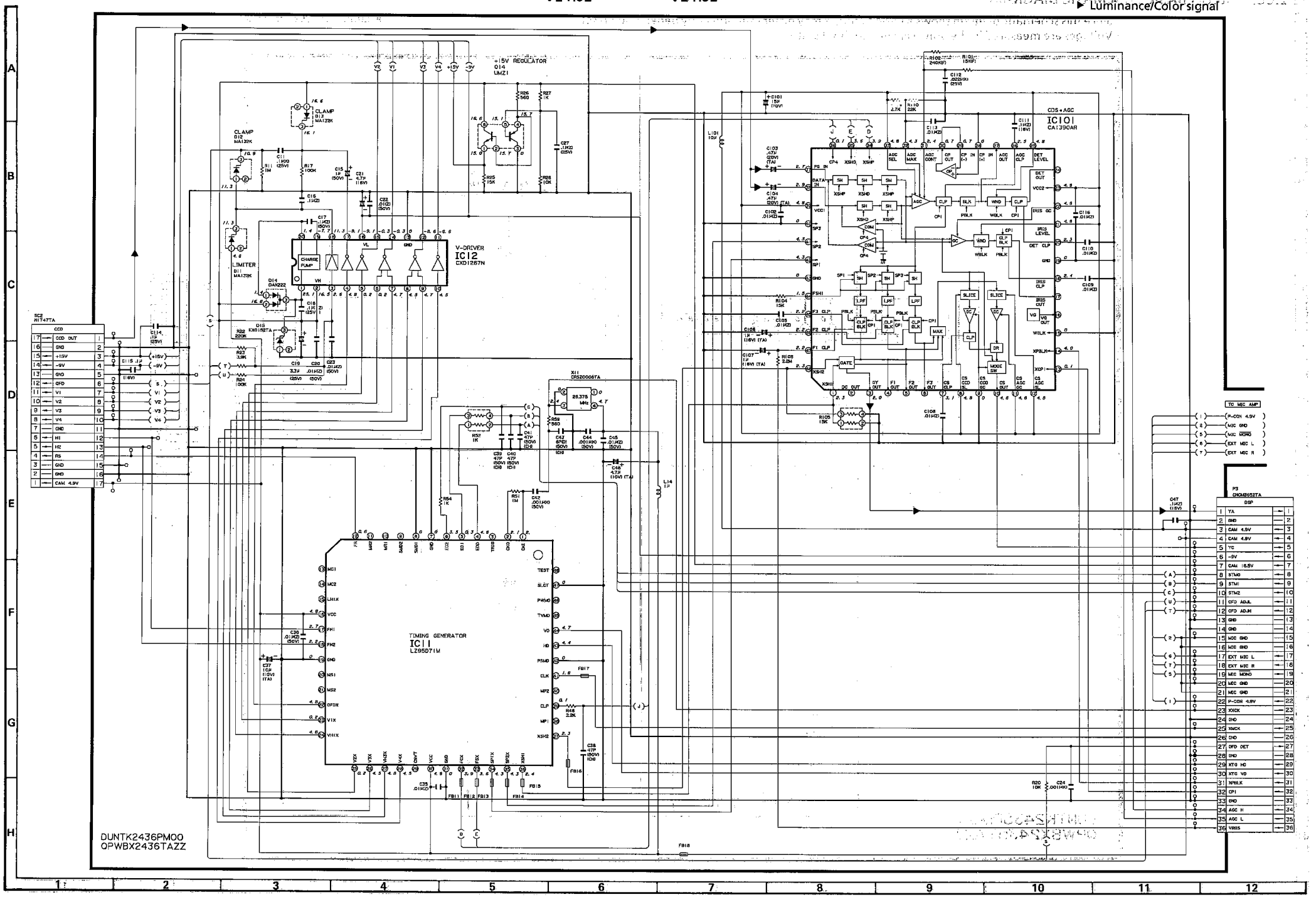
- Since this schematic diagram shows a basic circuit, it may differ insignificantly depending on set.
- Voltages are measured in the gray scale image shoot state.

▶ Luminance/Color signal



DUNTK2435PM00
QPWBX2435TAZZ

▶ Luminance/Color signal

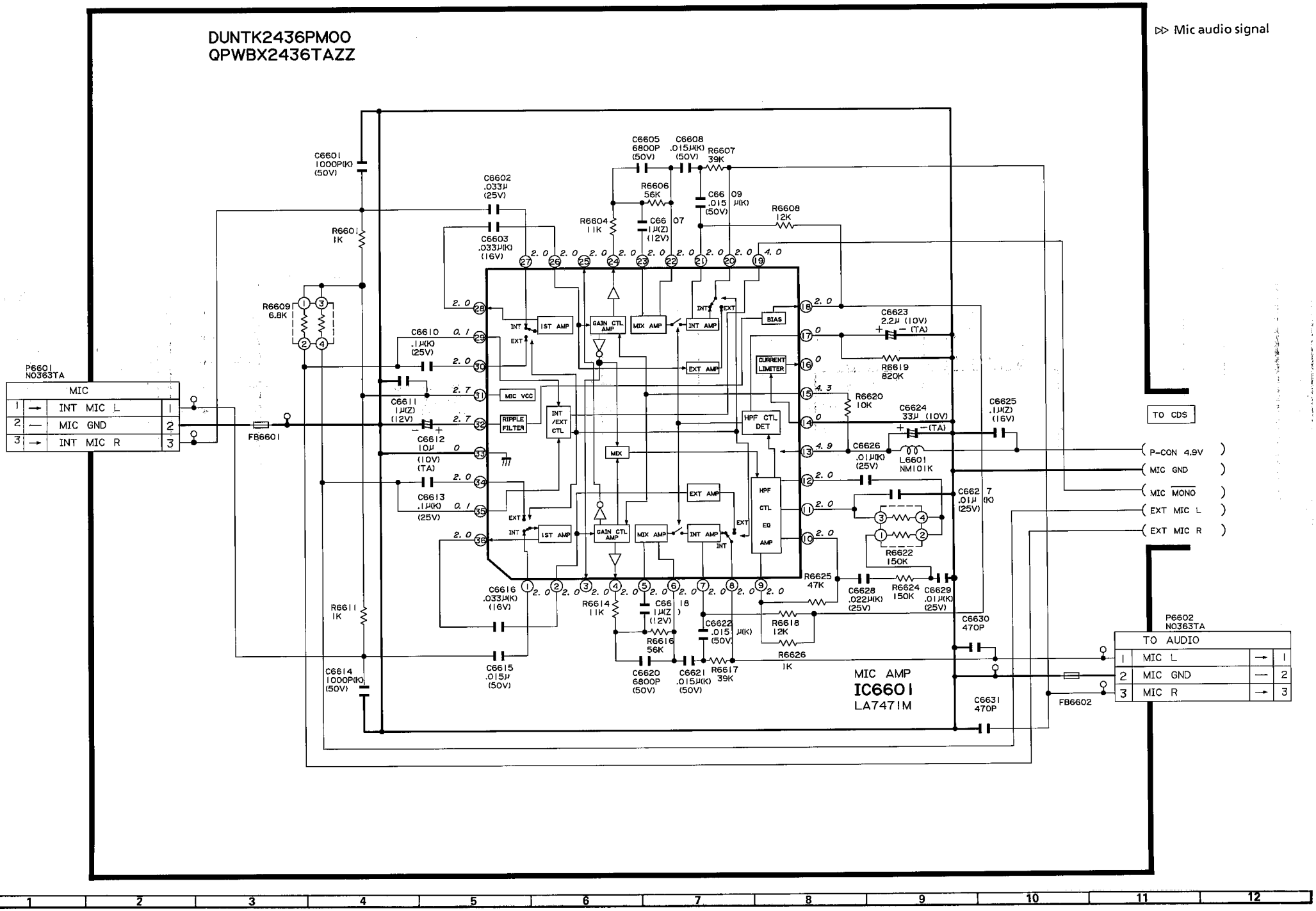


12-4.MIC AMP CIRCUIT BASIC SCHEMATIC DIAGRAM

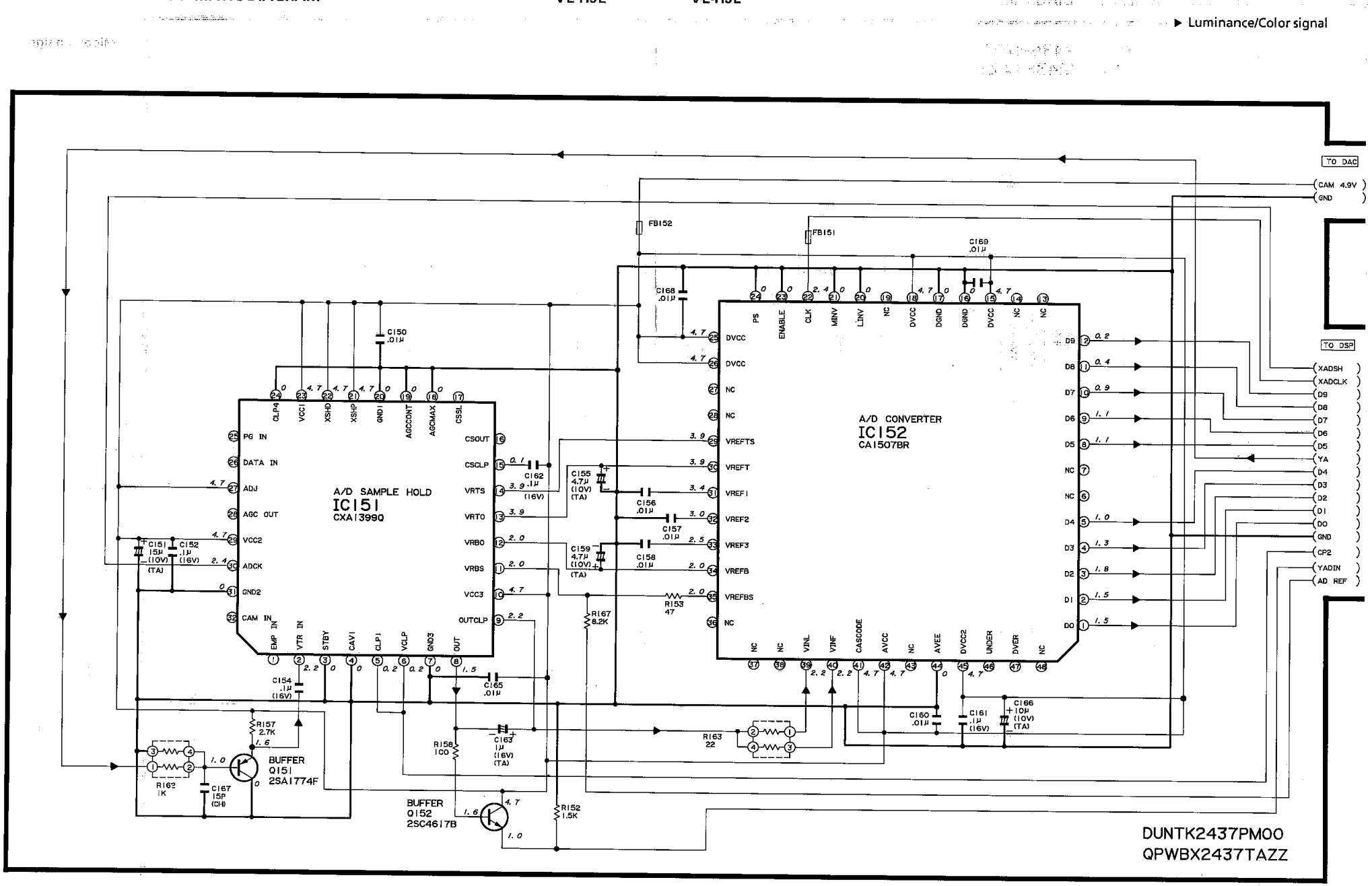
VL-H400S/H/X
VL-H9E

DUNTK2436PM00
QPWBX2436TAZZ

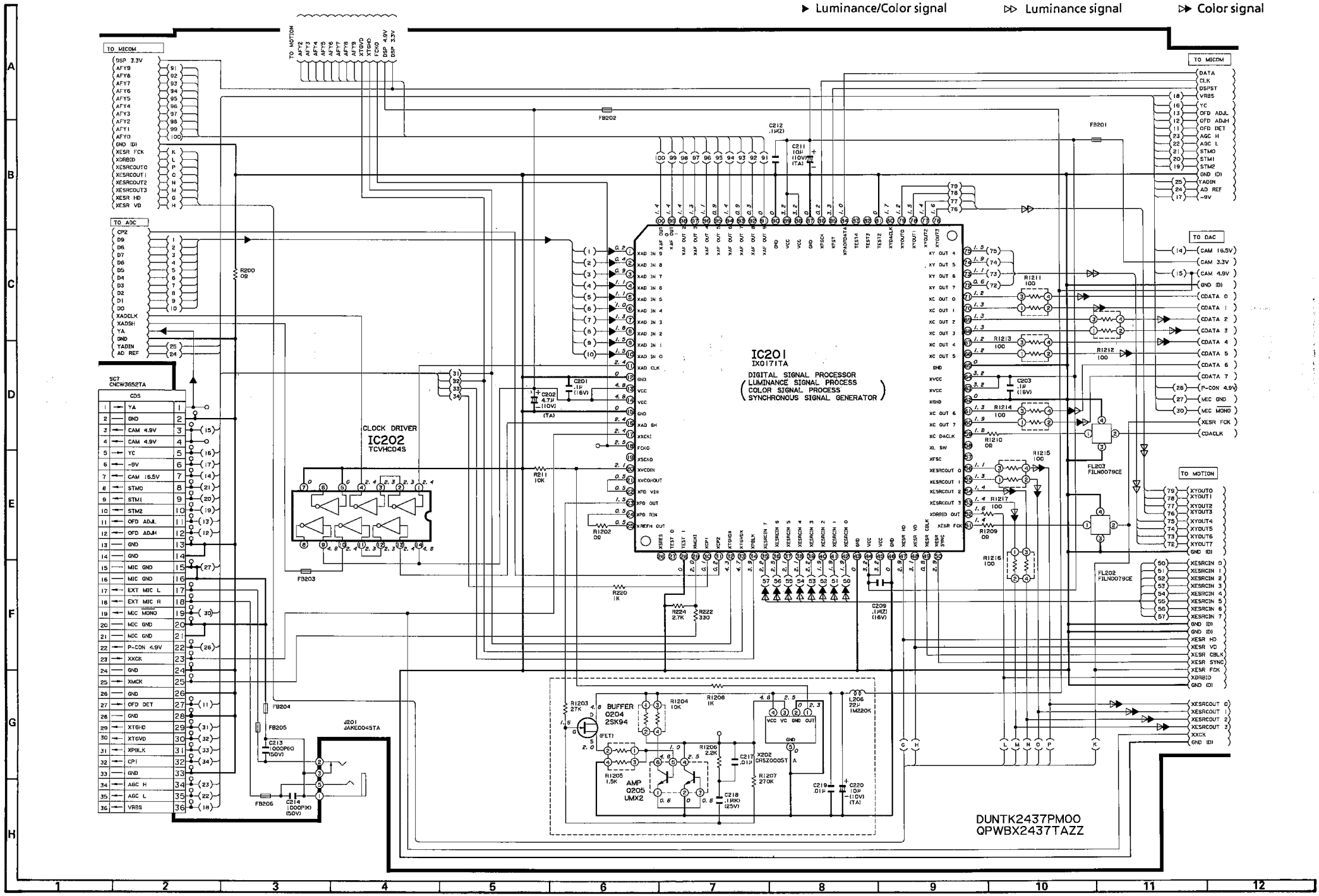
▷▷ Mic audio signal

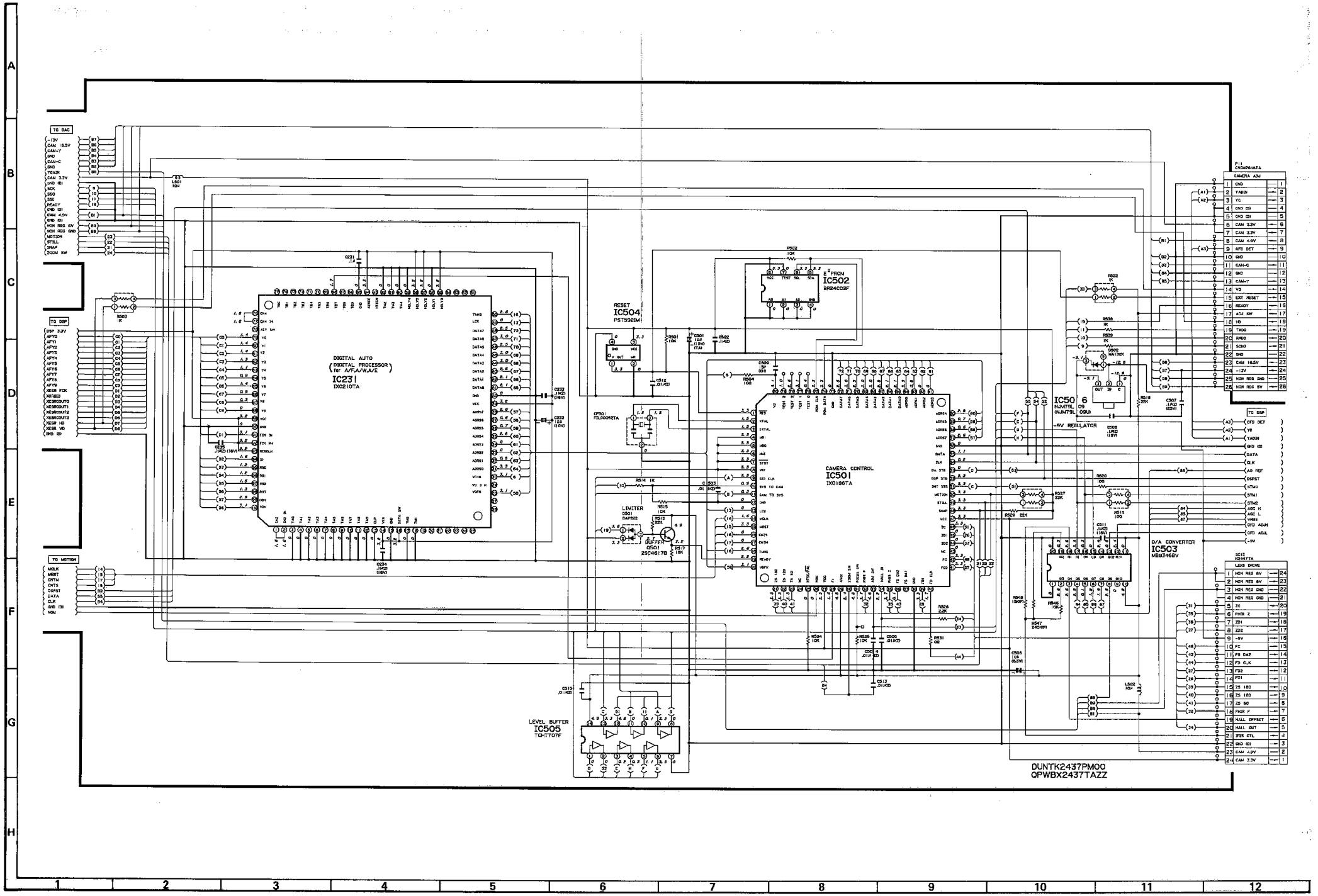


▶ Luminance/Color signal

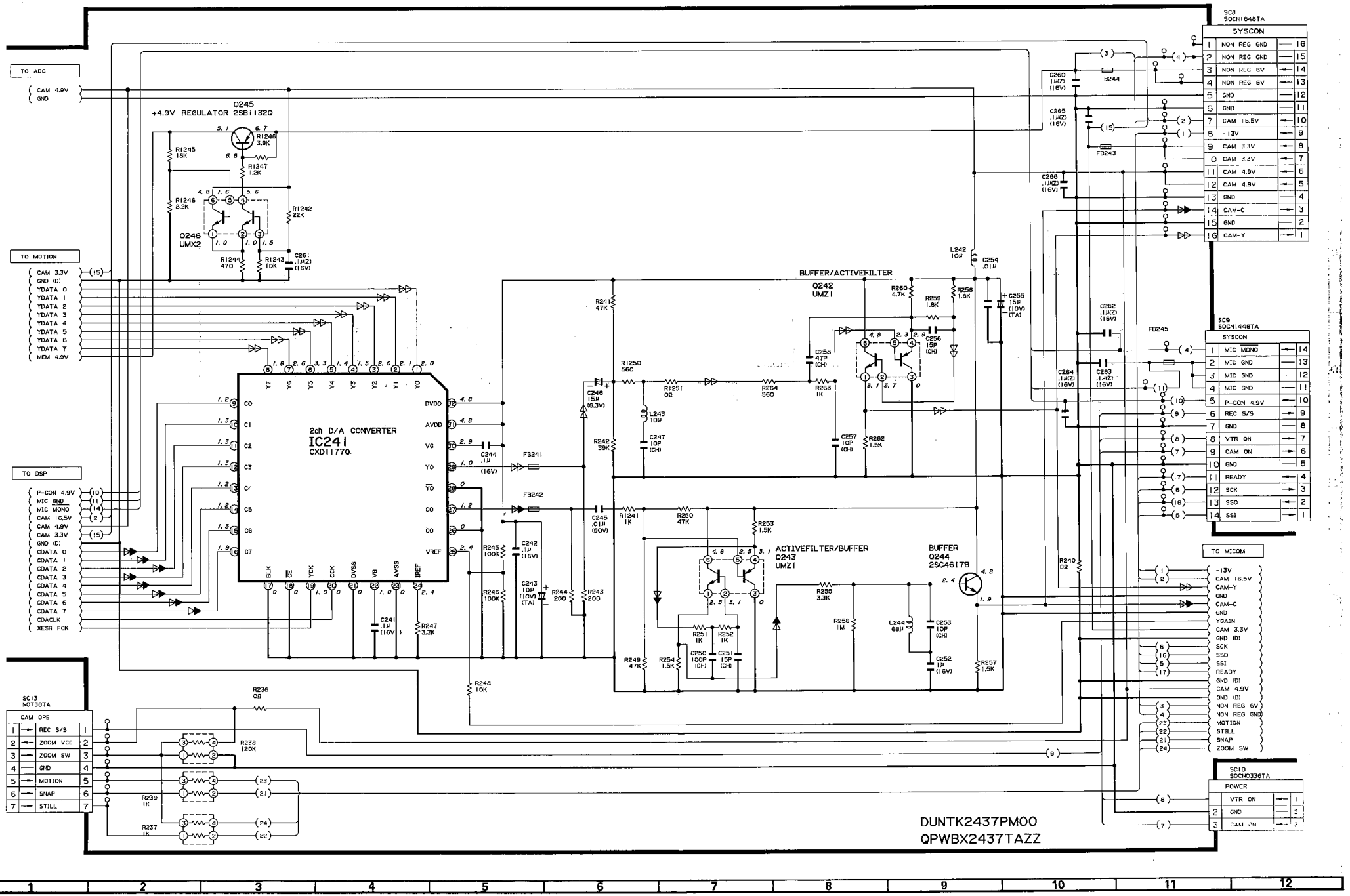


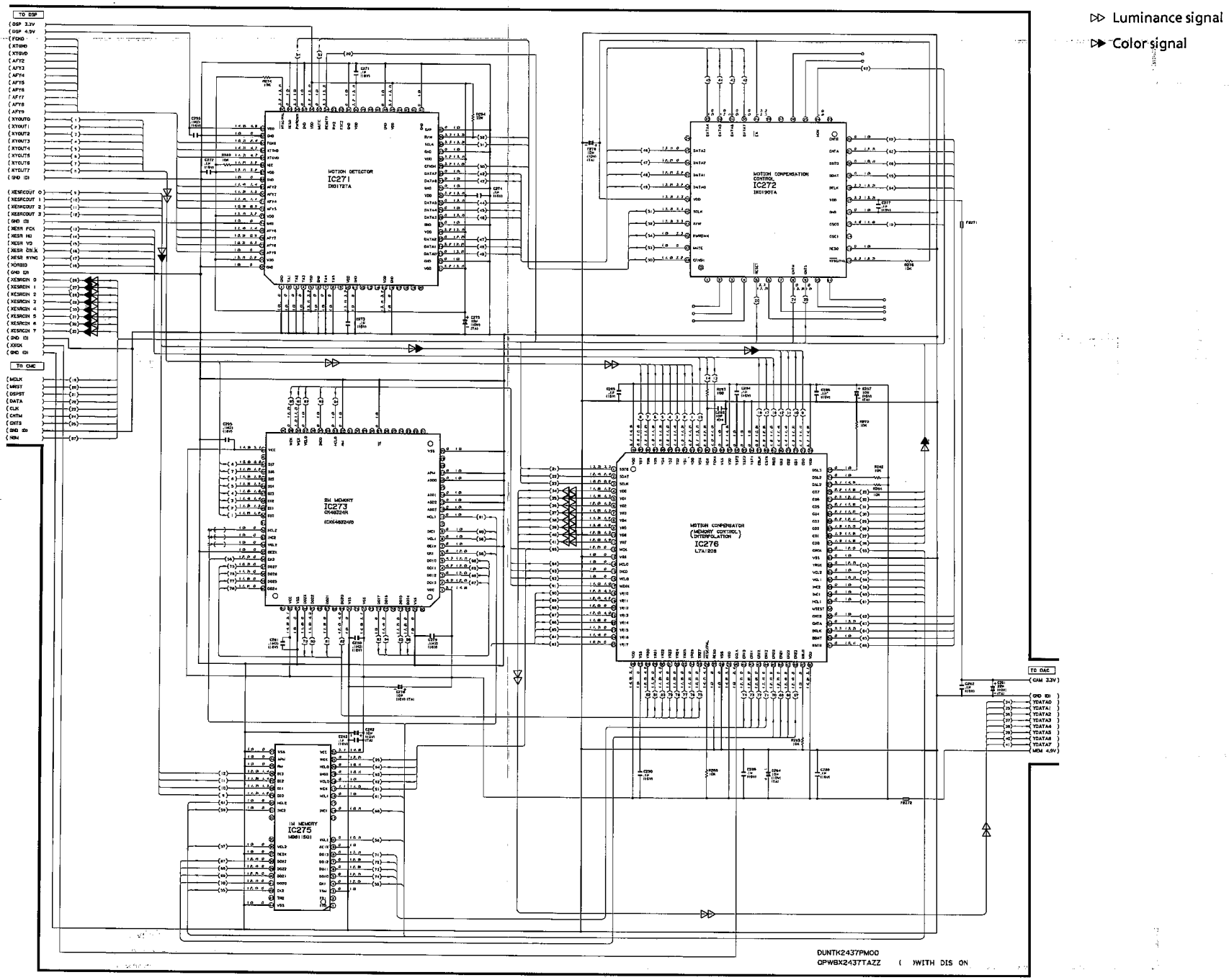
▶ Luminance/Color signal ▷▷ Luminance signal ▷▷ Color signal

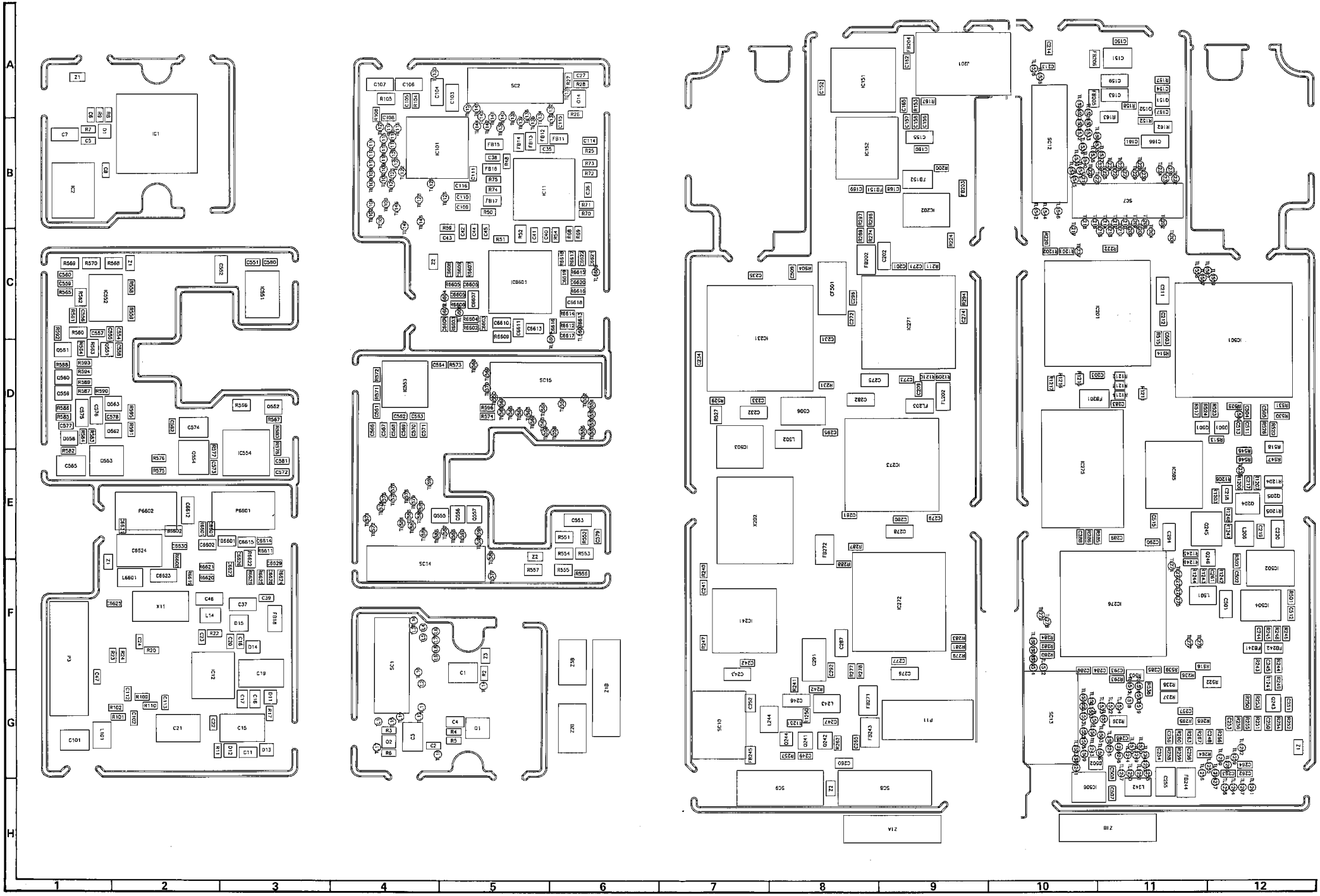



TO DAC
TO DSP
TO MOTION
DIGITAL AUTO
(DIGITAL PROCESSOR)
for A/F,A/W,A/E
IC231
IX0210TA
RESET
IC504
PST9928M
EEPROM
IC502
BR24C02F
CAMERA CONTROL
IC501
IX0186TA
IC506
NJM79L09U
-9V REGULATOR
D/A CONVERTER
IC503
MB3346BV
LIMITER
D501
DAP222
BUFFER
Q501
2SC4617B
LEVEL BUFFER
IC505
TCH1707F
CAMERA ADJ
LENS DRIVE
DUNTK2437PM00
QPWBX2437TAZZ

▷▷ Luminance signal ▷▶ Color signal

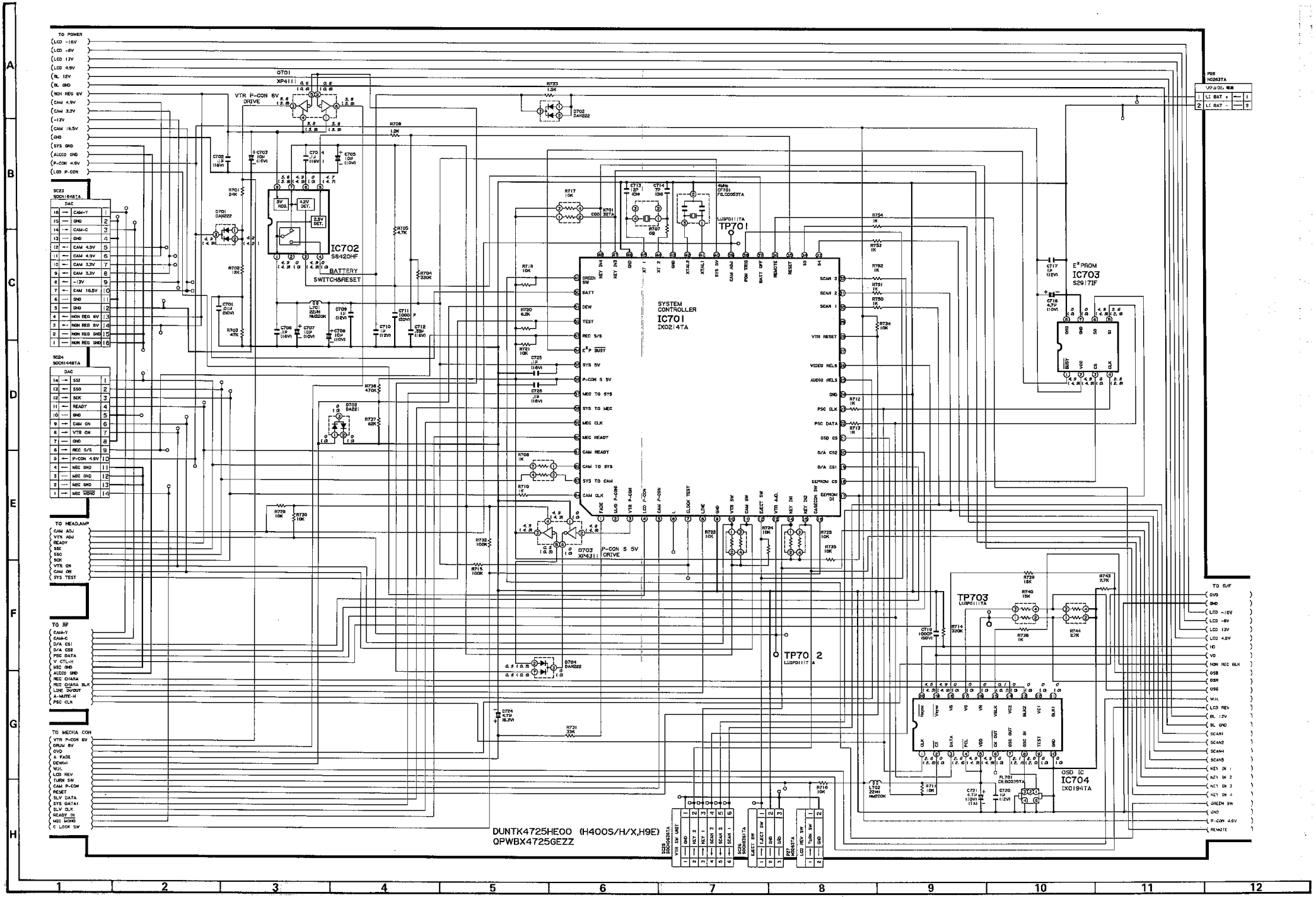


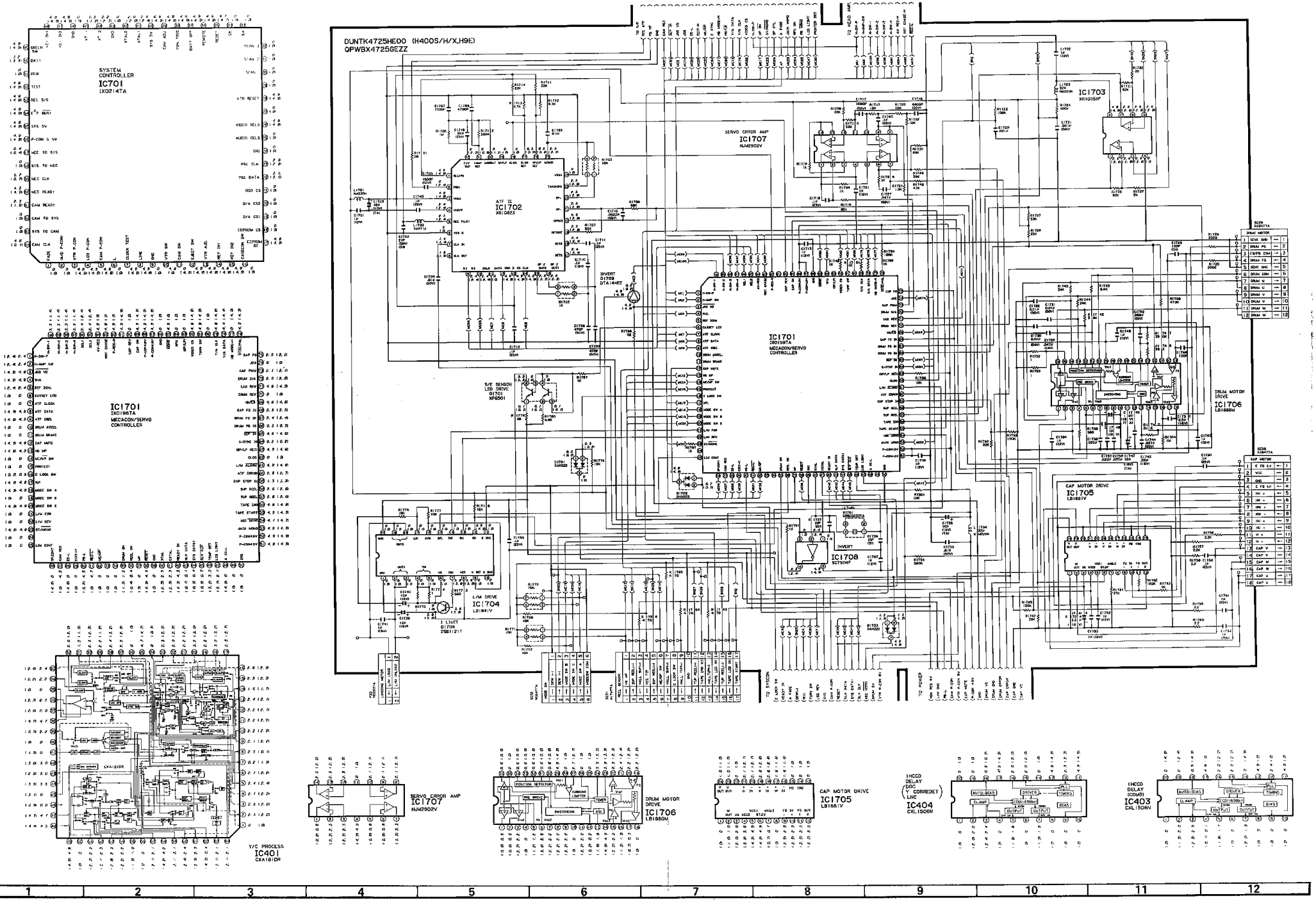

Luminance signal
Color signal
TO DSP
TO CMC
TO DAC
MOTION DETECTOR
IC271
MOTION COMPENSATION CONTROL
IC277
2M MEMORY
IC273
MOTION COMPENSATOR (MEMORY CONTROL) (INTERPOLATION)
IC276
1M MEMORY
IC275
DUNTK2437PM00
QPWBX2437TAZZ
WITH DIS ON



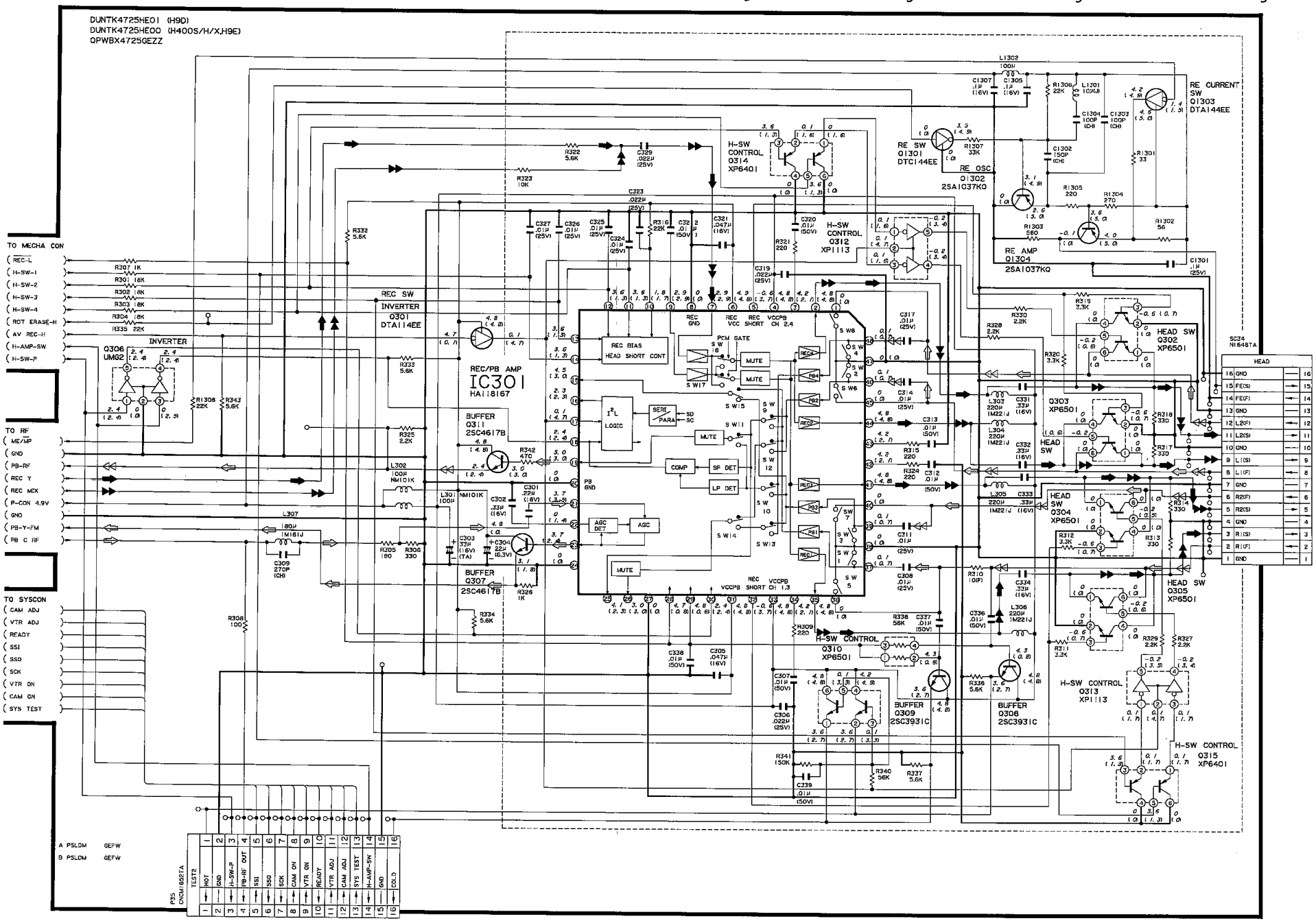
12-11.SYSTEM CONTROLLER CIRCUIT BASIC SCHEMATIC DIAGRAM

VL-H400S/H/X
VL-H9E

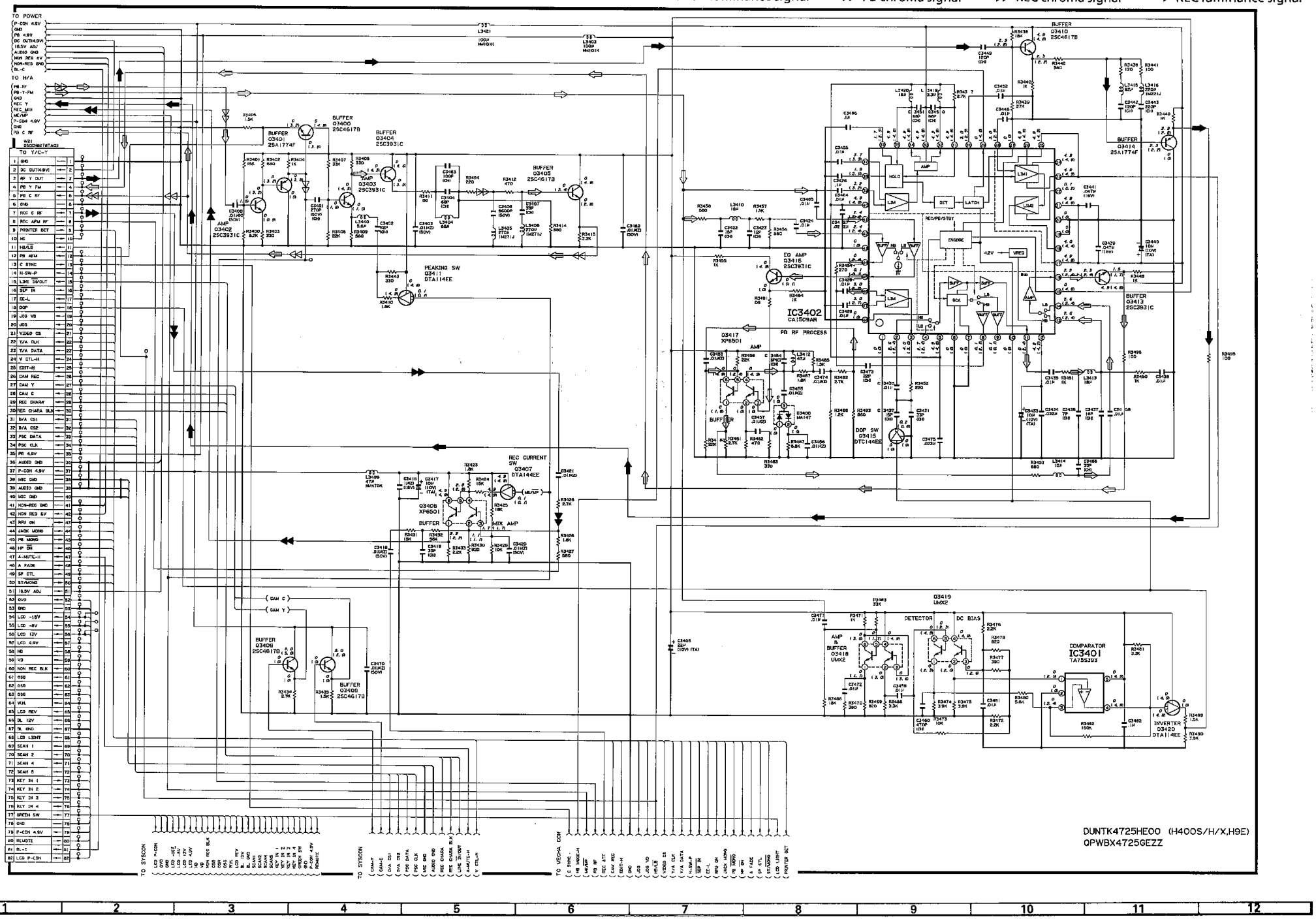



DUNTK4725HE00 (H400S/H/X,H9E)
QPWBX4725GEZZ
SYSTEM CONTROLLER IC701 IX0214TA
IC1701 IX0198TA MECACON/SERVO CONTROLLER
ATF IC IC1702 XRI0863
SERVO ERROR AMP IC1707 NJM2902V
IC1703 XRI0358F
INVERT D1709 DTA144EE
S/E SENSOR LED DRIVE D1701 XP6501
L/M DRIVE IC1704 LB1841V
T LIMIT D1706 2SB1121T
INVERT IC1708 BU7324F
DRUM MOTOR DRIVE IC1706 LB1660M
CAP MOTOR DRIVE IC1705 LB1881V
Y/C PROCESS IC401 CXA1810R
IHCCD DELAY (DOC V CORREDET) LINE IC404 CXL1506N
IHCCD DELAY (COMB) IC403 CXL1506N

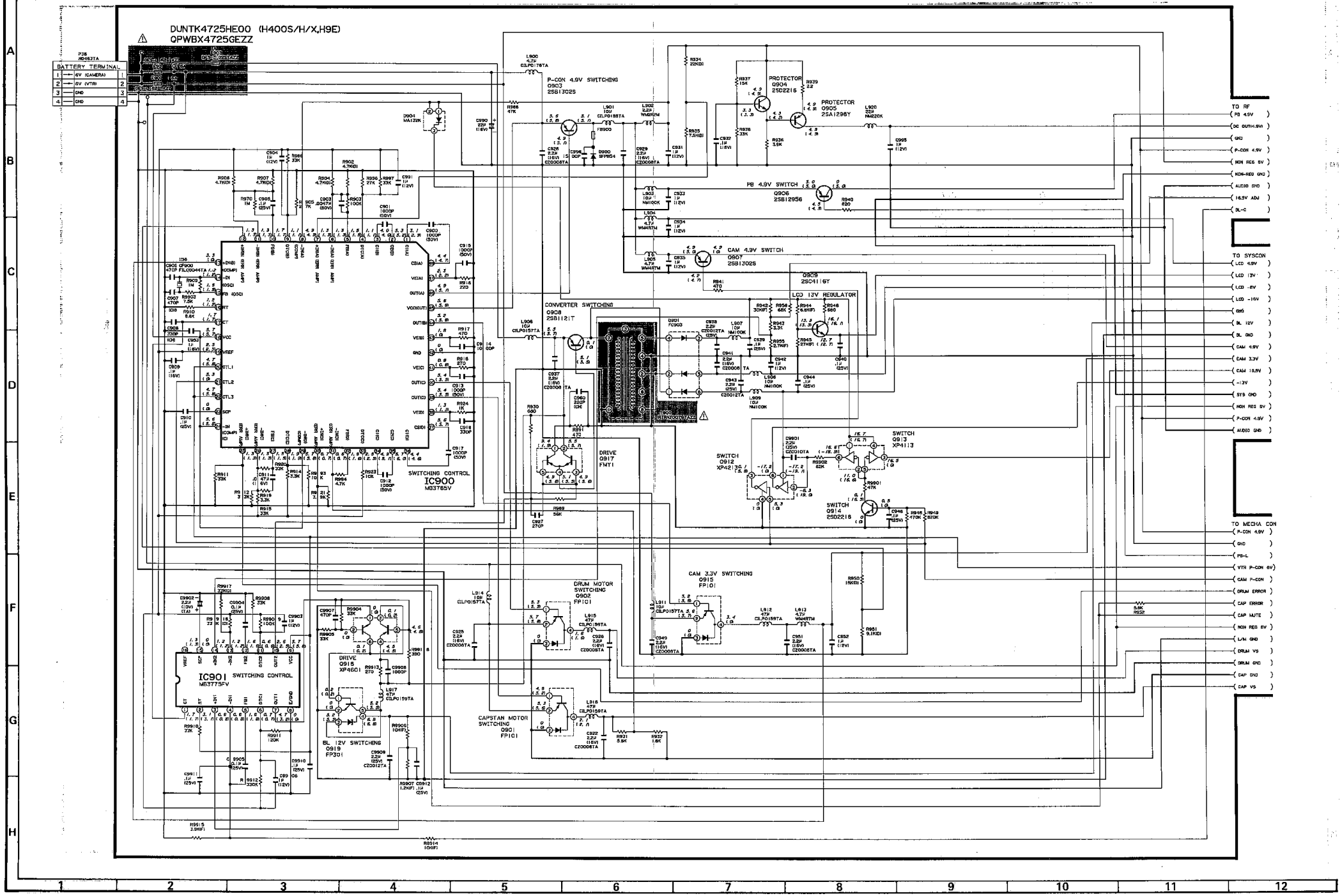
⇨ PB luminance signal ⇨ PB chroma signal ⇨ REC chroma signal ⇨ REC luminance signal

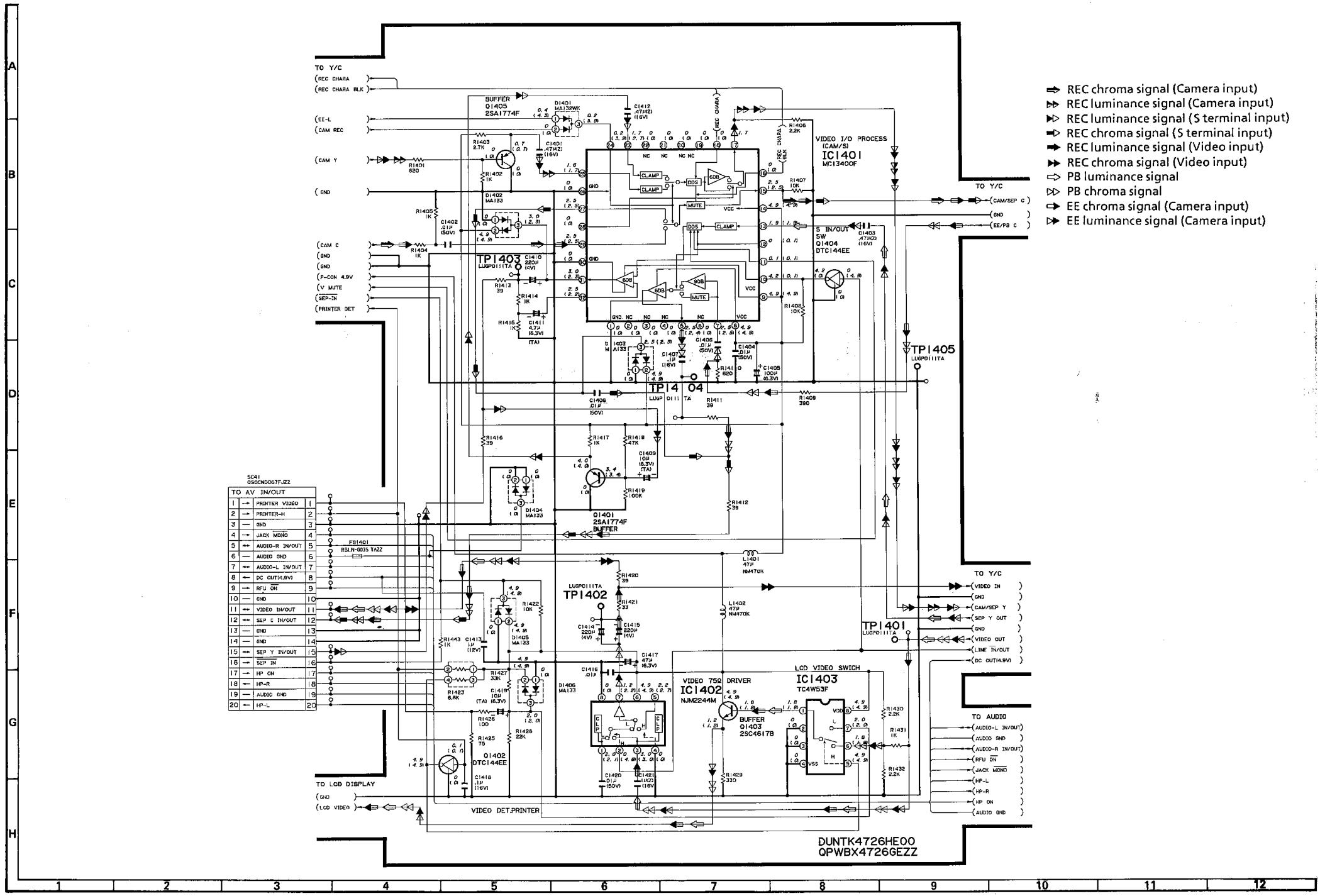


⇨ PB luminance signal ⇨ PB chroma signal ⇨ REC chroma signal ⇨ REC luminance signal

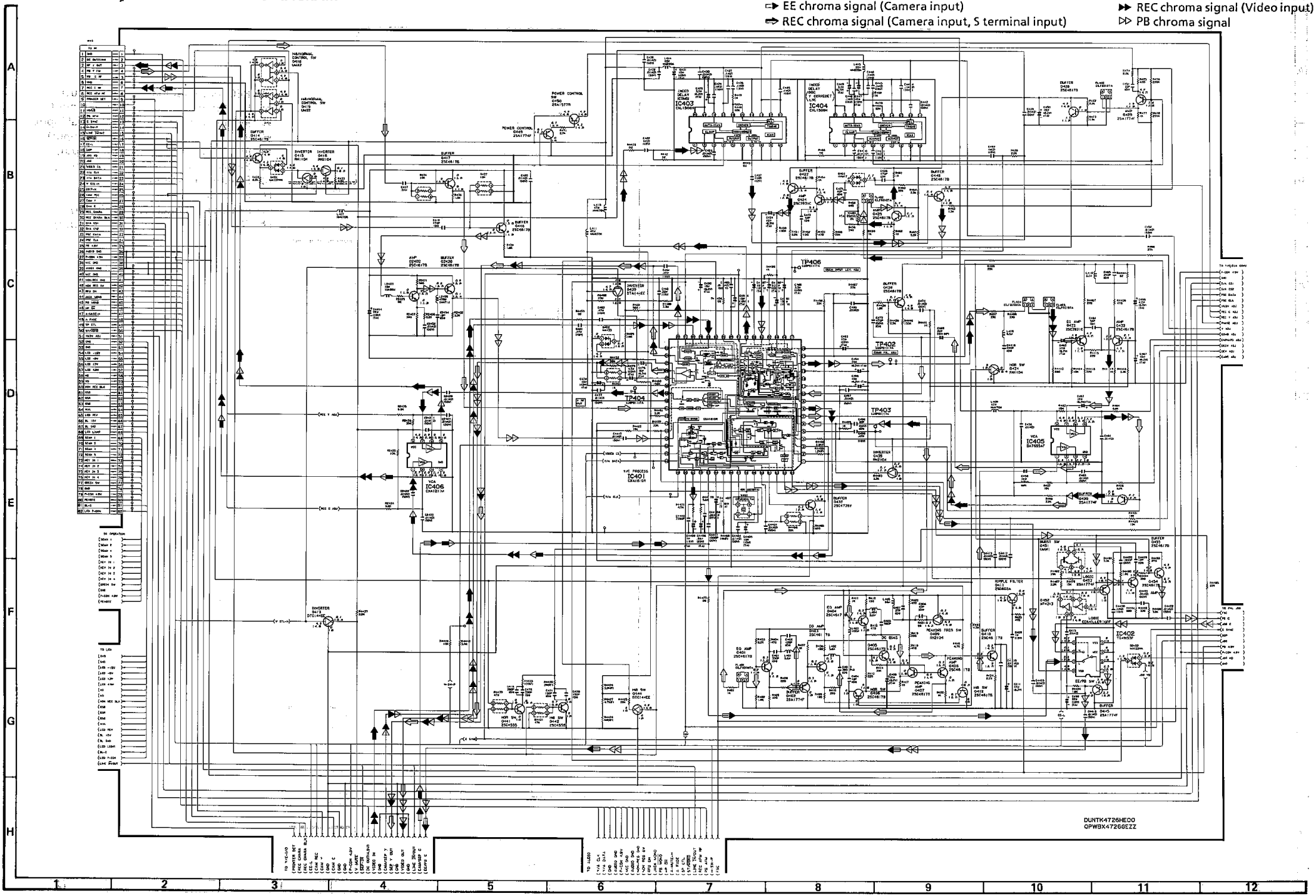


⚠ AND SHADED COMPONENTS = SAFETY RELATED PARTS



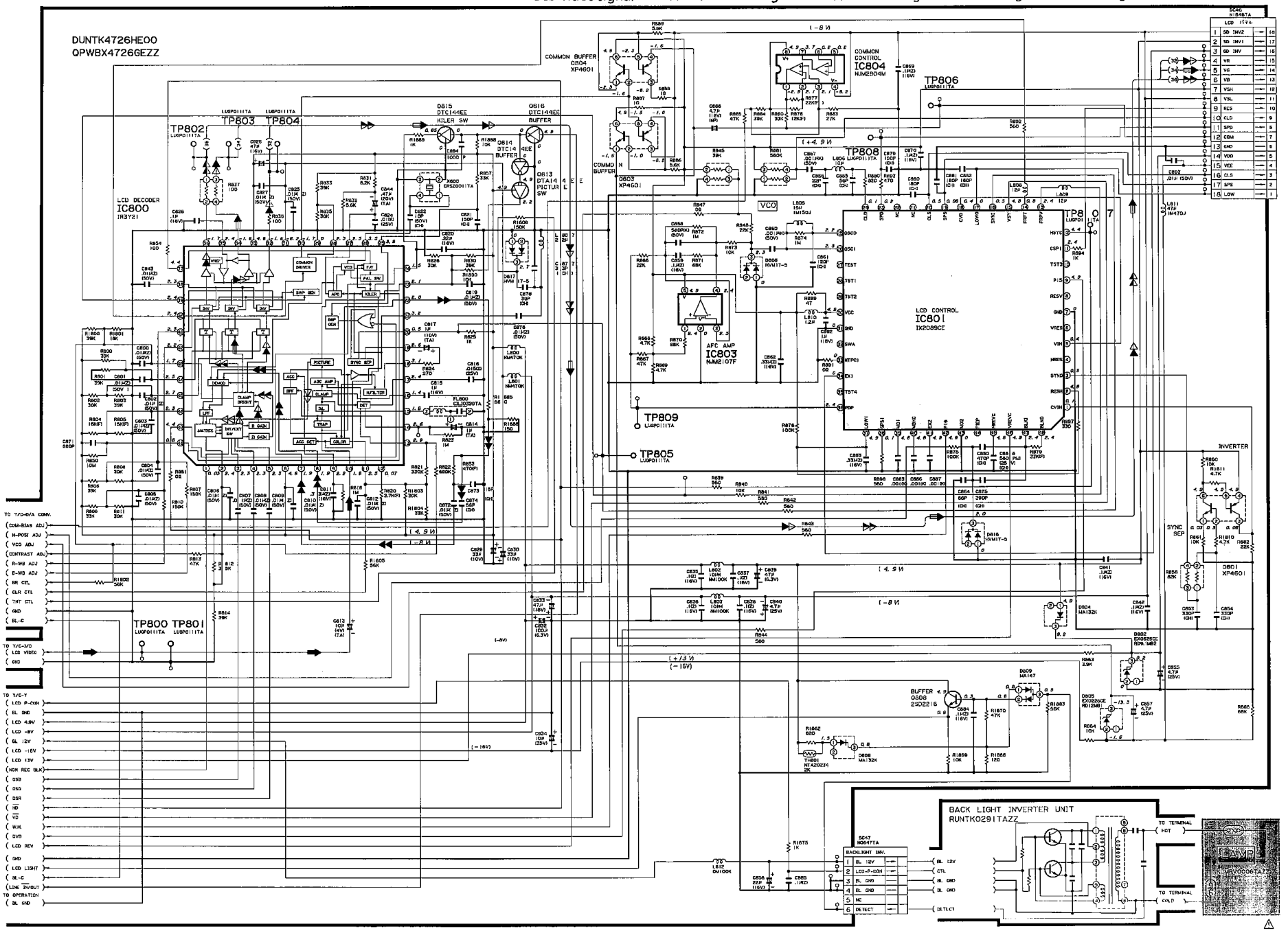

REC chroma signal (Camera input)
REC luminance signal (Camera input)
REC luminance signal (S terminal input)
REC chroma signal (S terminal input)
REC luminance signal (Video input)
REC chroma signal (Video input)
PB luminance signal
PB chroma signal
EE chroma signal (Camera input)
EE luminance signal (Camera input)
TO Y/C
BUFFER Q1405 2SA1774F
VIDEO I/O PROCESS (CAM/S) IC1401 MC13400F
S IN/OUT SW Q1404 DTC144EE
TP1403
TP1404
TP1405
TP1401
TP1402
TO AV IN/OUT
PRINTER VIDEO
PRINTER-H
GND
JACK MONO
AUDIO-R IN/OUT
AUDIO GND
AUDIO-L IN/OUT
DC OUT(14.9V)
RFU ON
VIDEO IN/OUT
SEP C IN/OUT
SEP Y IN/OUT
SEP IN
HP ON
HP-R
HP-L
VIDEO 75Ω DRIVER IC1402 NJM2244M
LCD VIDEO SWICH IC1403 TC4W53F
BUFFER Q1403 2SC4617B
Q1401 2SA1774F BUFFER
Q1402 DTC144EE
TO LCD DISPLAY
VIDEO DET,PRINTER
TO AUDIO
DUNTK4726HE00
QPWBX4726GEZZ

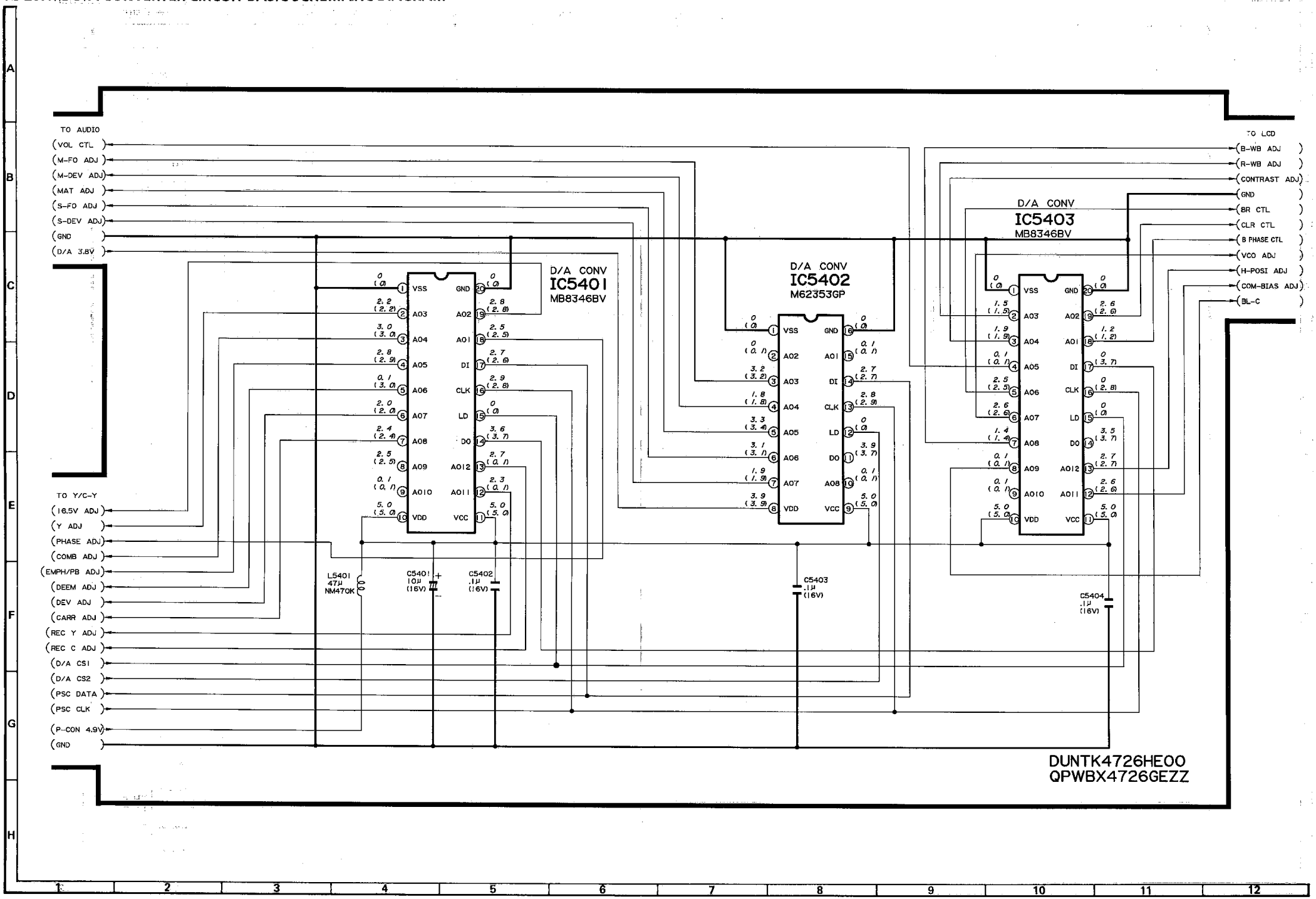
⇨ EE chroma signal (Camera input)
⇨ REC chroma signal (Camera input, S terminal input)
⇨ REC chroma signal (Video input)
⇨ PB chroma signal

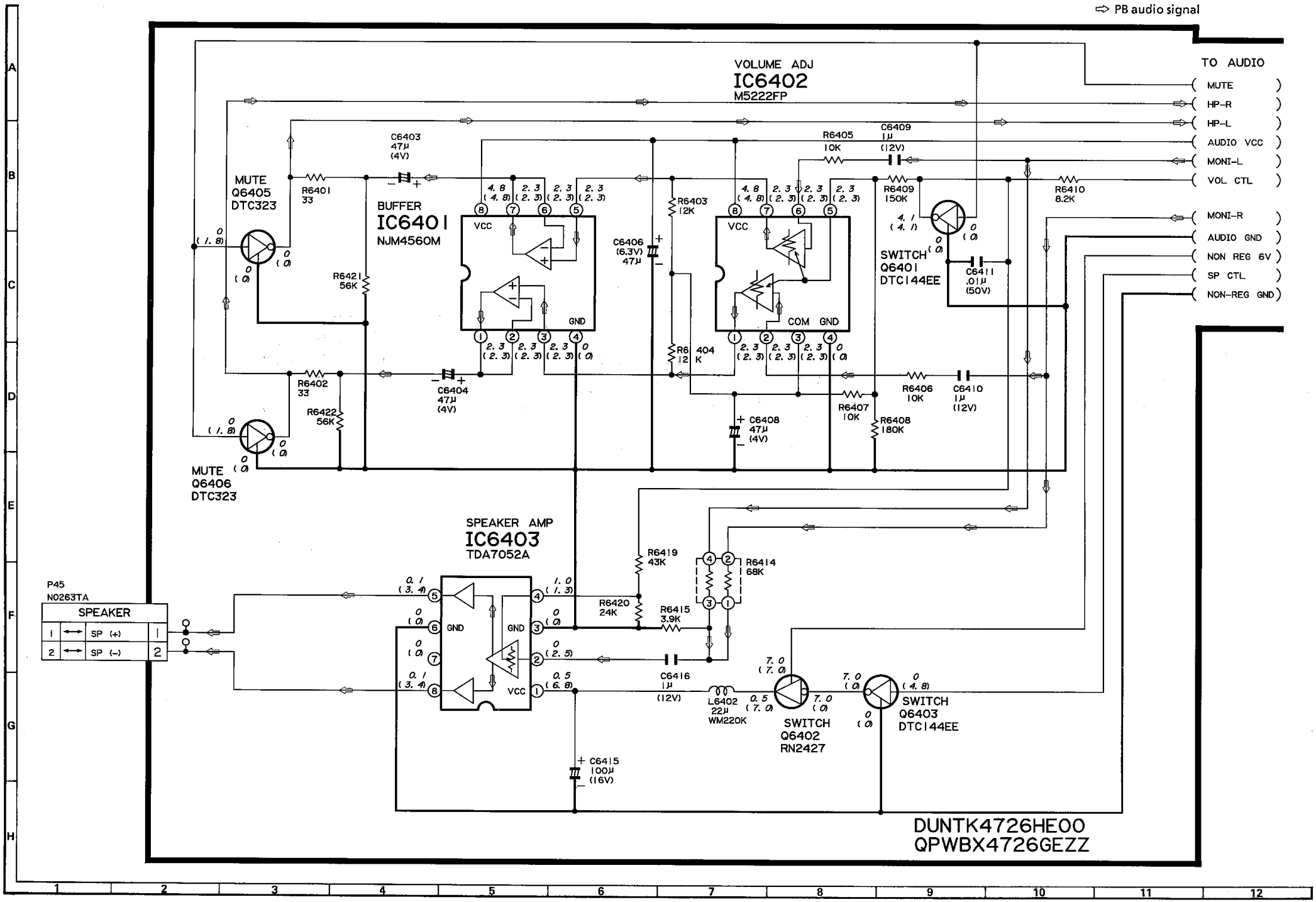


⚠ AND SHADED COMPONENTS = SAFETY RELATED PARTS

➡ LCD video signal ▷▷ Luminance signal ▶▶ chroma signal ▶▶ R signal ▶▶ G signal ▶▶ B signal



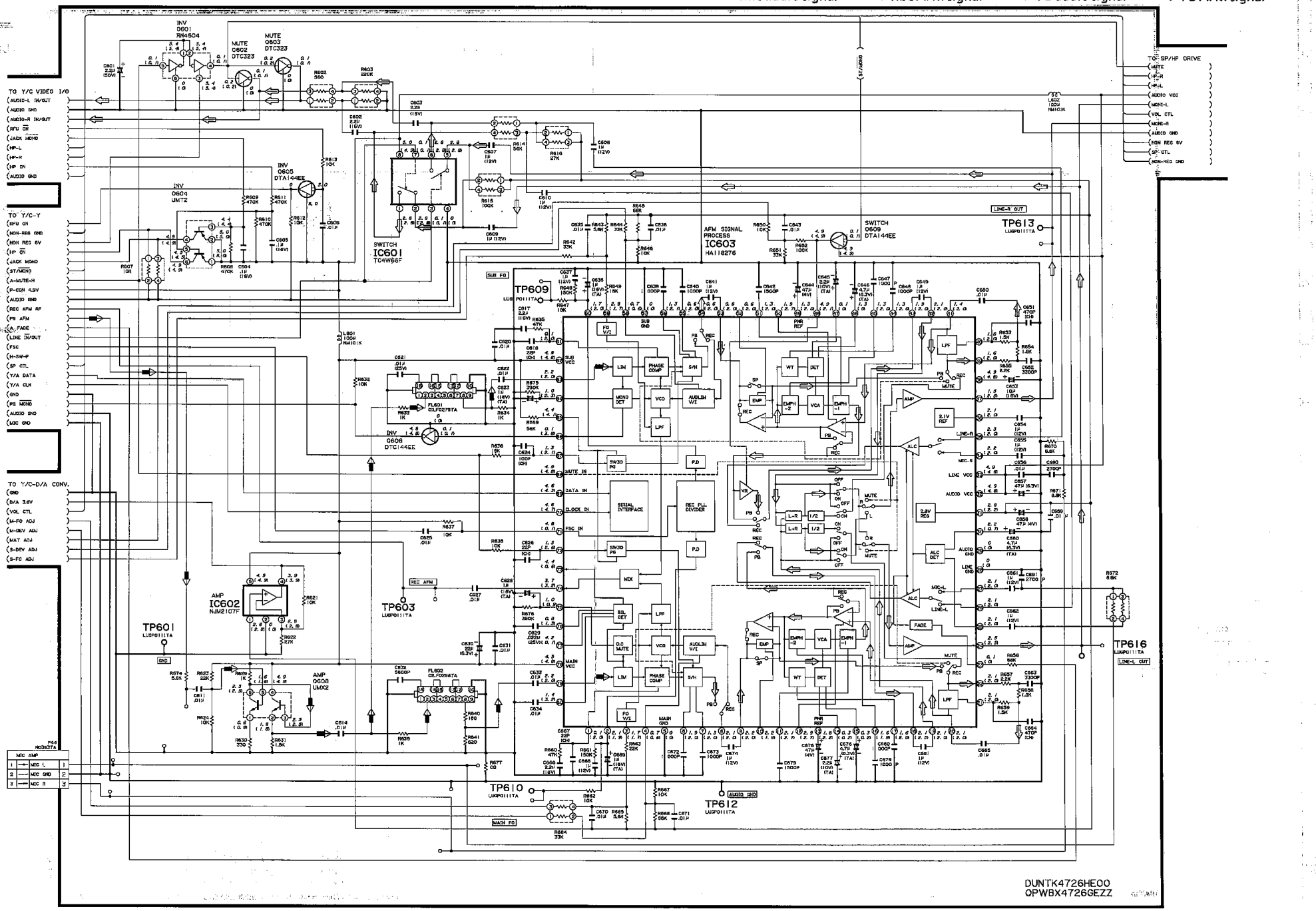

TO AUDIO
VOL CTL
M-FO ADJ
M-DEV ADJ
MAT ADJ
S-FO ADJ
S-DEV ADJ
GND
D/A 3.8V
TO Y/C-Y
16.5V ADJ
Y ADJ
PHASE ADJ
COMB ADJ
EMPH/PB ADJ
DEEM ADJ
DEV ADJ
CARR ADJ
REC Y ADJ
REC C ADJ
D/A CS1
D/A CS2
PSC DATA
PSC CLK
P-CON 4.9V
GND
D/A CONV
IC5401
MB8346BV
VSS
A03
A04
A05
A06
A07
A08
A09
A010
VDD
GND
A02
A01
DI
CLK
LD
DO
A012
A011
VCC
L5401
47µ
NM470K
C5401
10µ
(16V)
C5402
.1µ
(16V)
D/A CONV
IC5402
M62353GP
C5403
.1µ
(16V)
D/A CONV
IC5403
MB8346BV
C5404
.1µ
(16V)
TO LCD
B-WB ADJ
R-WB ADJ
CONTRAST ADJ
GND
BR CTL
CLR CTL
B PHASE CTL
VCO ADJ
H-POSI ADJ
COM-BIAS ADJ
BL-C
DUNTK4726HE00
QPWBX4726GEZZ

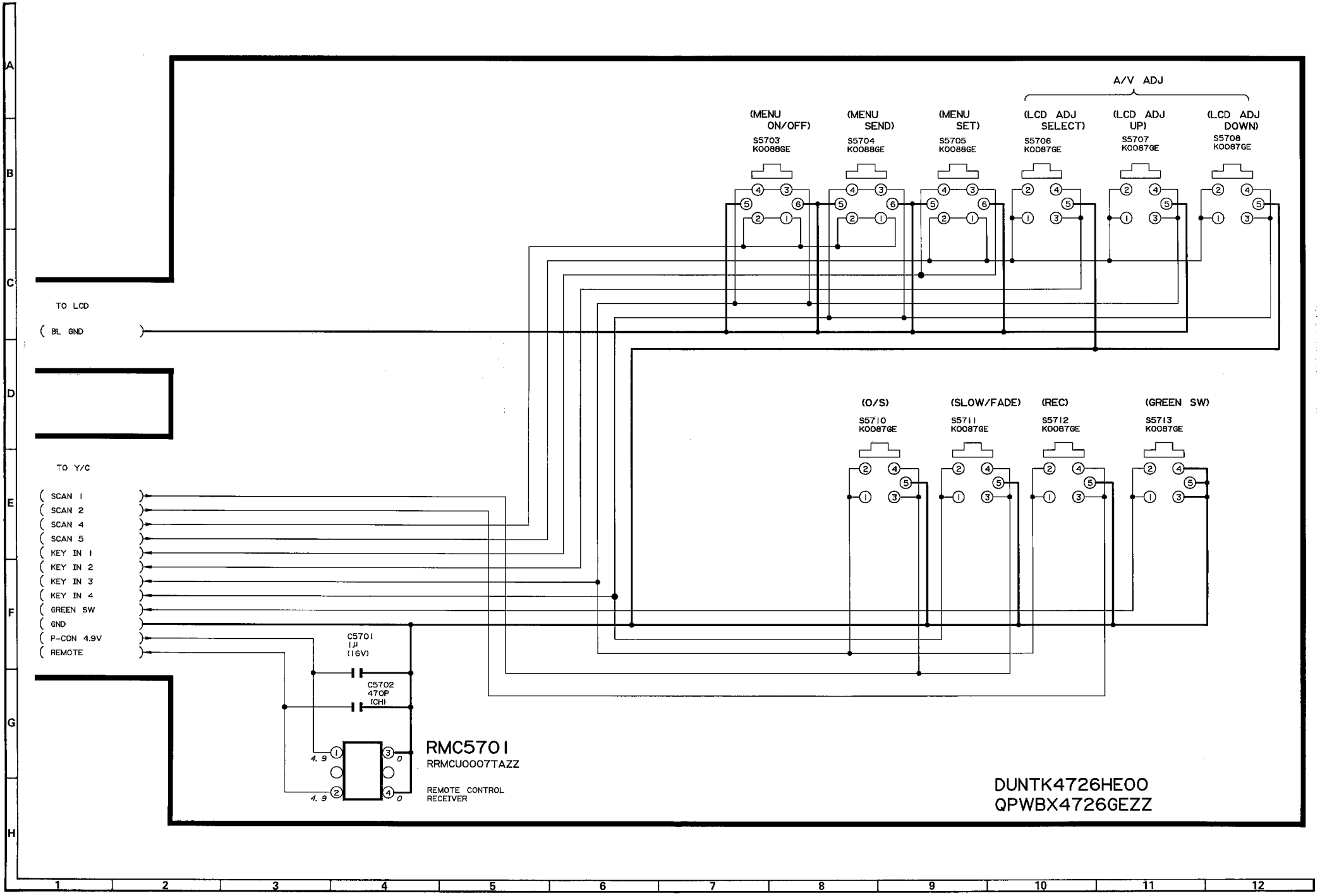

⇨ PB audio signal
VOLUME ADJ
IC6402
M5222FP
TO AUDIO
MUTE
HP-R
HP-L
AUDIO VCC
MONI-L
VOL CTL
MONI-R
AUDIO GND
NON REG 6V
SP CTL
NON-REG GND
C6403 47µ (4V)
R6405 10K
C6409 1µ (12V)
MUTE Q6405 DTC323
R6401 33
BUFFER
IC6401
NJM4560M
R6403 12K
C6406 (6.3V) 47µ
R6409 150K
R6410 8.2K
SWITCH Q6401 DTC144EE
C6411 .01µ (50V)
R6421 56K
R6402 33
C6404 47µ (4V)
R6422 56K
R6404 12K
R6406 10K
C6410 1µ (12V)
R6407 10K
C6408 47µ (4V)
R6408 180K
MUTE Q6406 DTC323
SPEAKER AMP
IC6403
TDA7052A
R6419 43K
R6414 68K
R6420 24K
R6415 3.9K
P45
N0263TA
SPEAKER
SP (+)
SP (-)
C6416 1µ (12V)
L6402 22µ WM220K
SWITCH Q6402 RN2427
SWITCH Q6403 DTC144EE
C6415 100µ (16V)
DUNTK4726HE00
QPWBX4726GEZZ

VL-H400S/H/X
VL-H9E

12-22.AUDIO CIRCUIT BASIC SCHEMATIC DIAGRAM

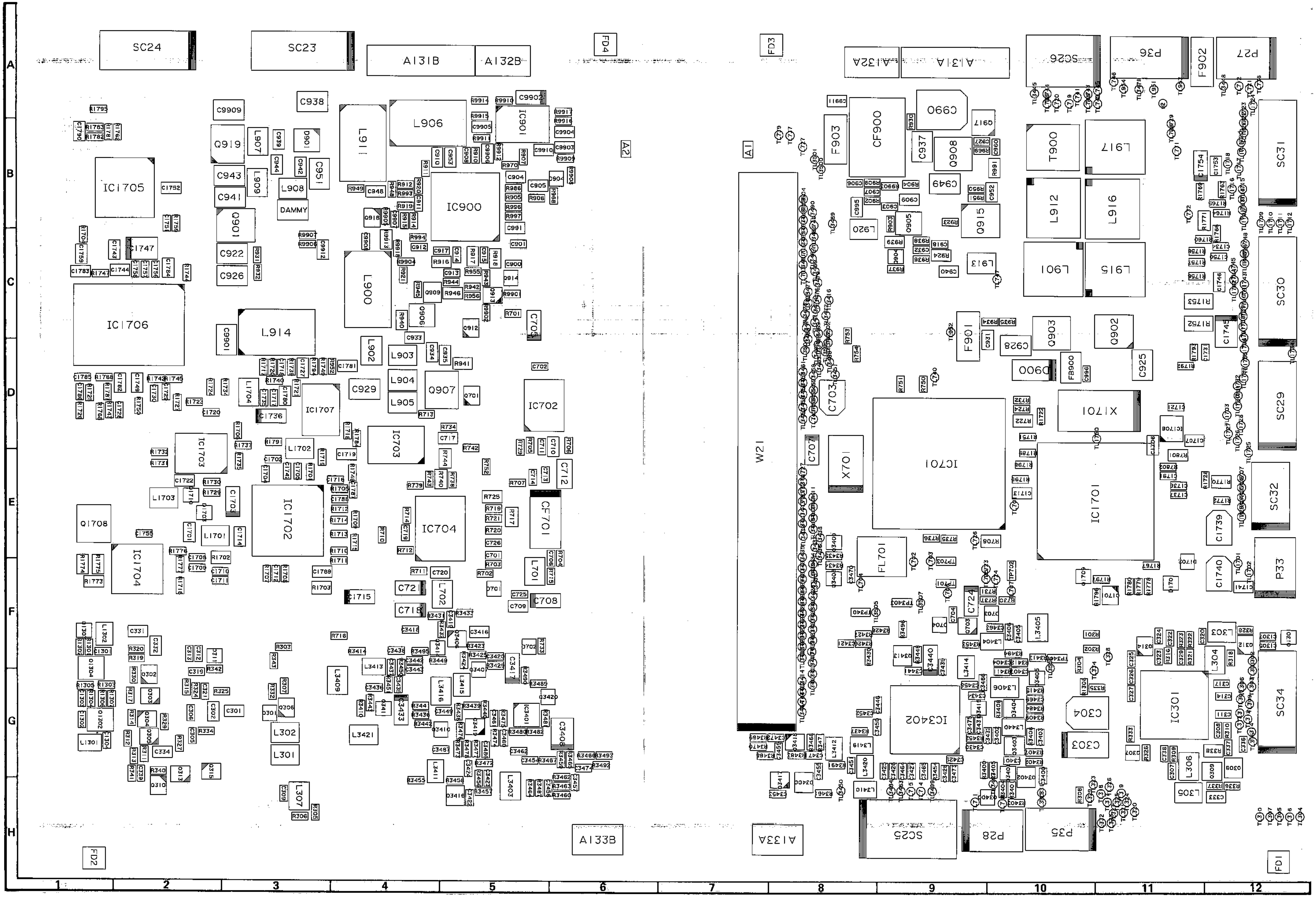
▷▷ Mic audio signal ▶▷ REC AFM signal ⇨ PB audio signal ➡ PB AFM signal



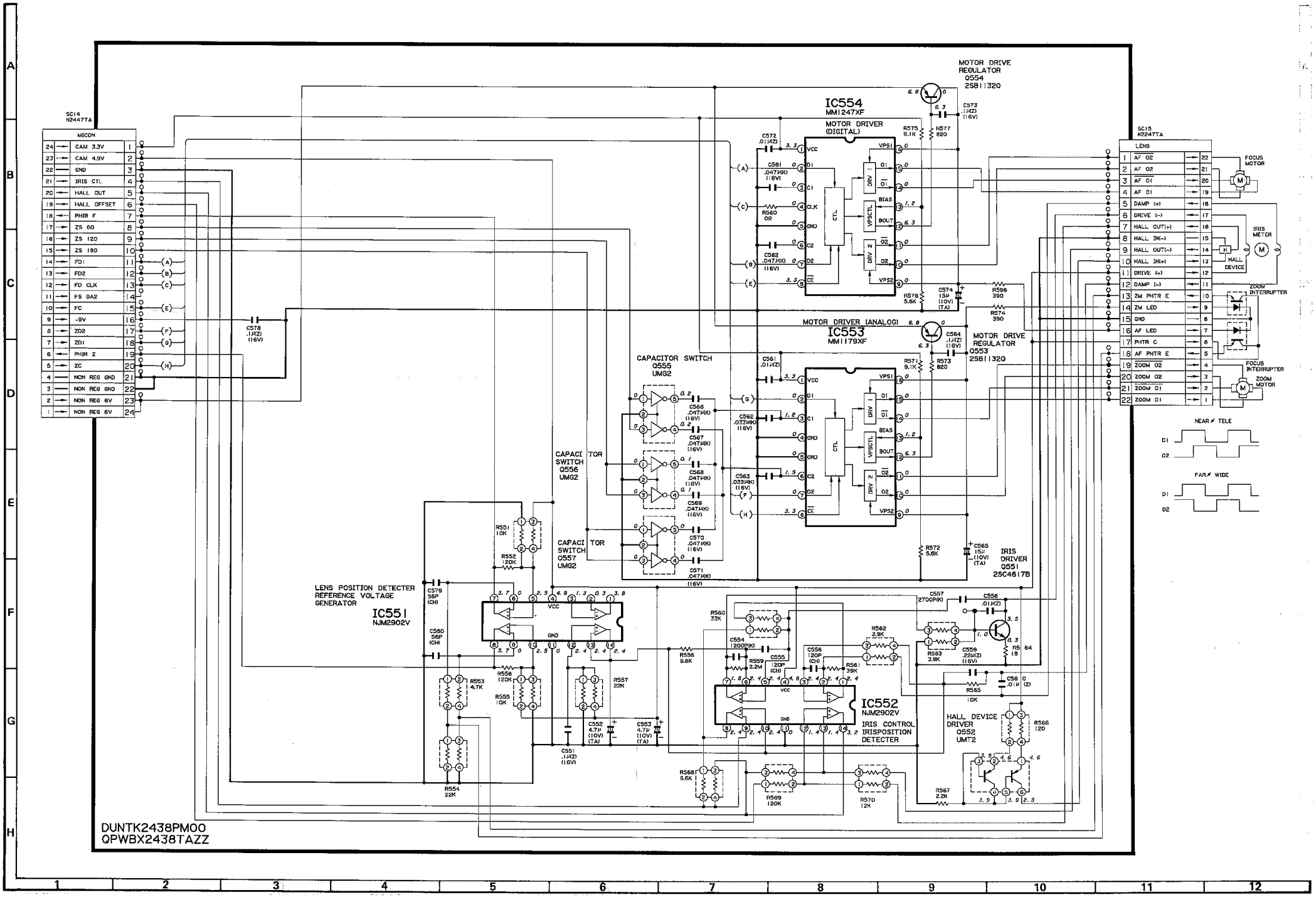

A/V ADJ
(MENU ON/OFF)
S5703
K0088GE
(MENU SEND)
S5704
K0088GE
(MENU SET)
S5705
K0088GE
(LCD ADJ SELECT)
S5706
K0087GE
(LCD ADJ UP)
S5707
K0087GE
(LCD ADJ DOWN)
S5708
K0087GE
(O/S)
S5710
K0087GE
(SLOW/FADE)
S5711
K0087GE
(REC)
S5712
K0087GE
(GREEN SW)
S5713
K0087GE
TO LCD
BL GND
TO Y/C
SCAN 1
SCAN 2
SCAN 4
SCAN 5
KEY IN 1
KEY IN 2
KEY IN 3
KEY IN 4
GREEN SW
GND
P-CON 4.9V
REMOTE
C5701
1μ
(16V)
C5702
470P
(CH)
RMC5701
RRMCU0007TAZZ
REMOTE CONTROL
RECEIVER
4.9
0
DUNTK4726HE00
QPWBX4726GEZZ

VL-H400S/H/X
VL-H9E

VL-H400S/H/X
VL-H9E

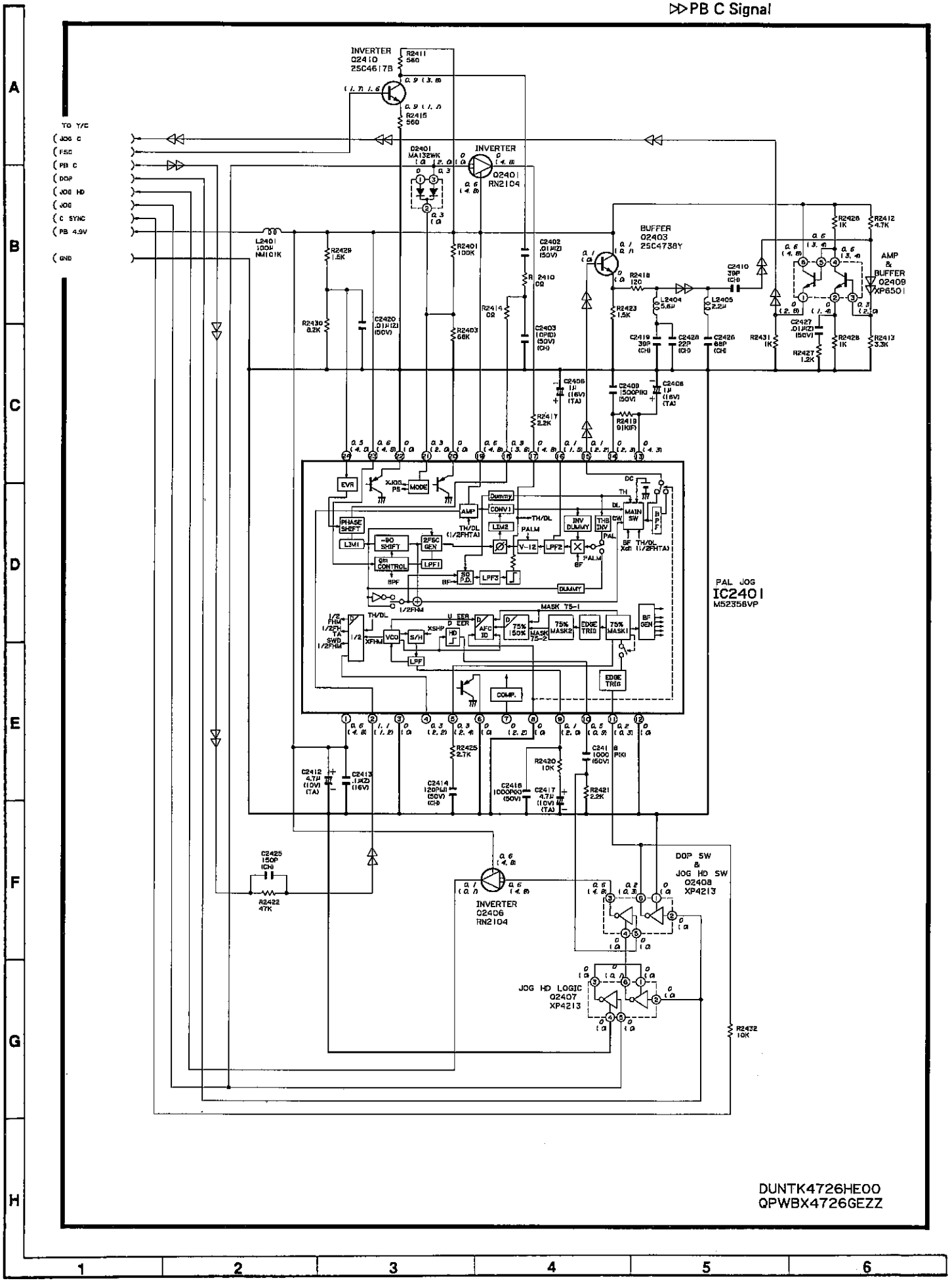


MT5
MT6
MT4
S5705
S5704
S5703
L812
C856
C832
X800
C833
C834
C831
C830
C839
C840
C829
C826
C855
C857
C868
C804
P801
C823
C844
C817
C814
FL801
C813
L803
L801
L802
L805
D802
C805
C5401
L5401
IC5403
C6415
C6406
IC6402
IC6403
L6402
L602
C6408
C658
C6404
C6403
C602
C676
C657
C653
C644
C601
FL602
FL601
C630
W43
C411
L414
C43
FL401
L415
FL403
FL402
IC406
L417
C469
C459
C403
C447
C404
L404
L403
C468
C491
C434
L411
C1405
C1410
C480
C476
C479
C478
IC2401
FL405
FL404
X401
C1417
IC1401
C1414
C1415
SC46
L811
IC1403
FD1
FD2
MT1
MT3
MT2
P45
P44
S5706
S5708
S5707
IC6401
IC6603
IC6800
IC5402
IC6801
IC5401
SC47
SC41
IC1402
IC401
IC403
IC404
IC402
IC405
S5710
S5713
S5711
S5712
RMC5701
FD3
FD4


SC14
N2447TA
MICON
CAM 3.3V
CAM 4.9V
GND
IRIS CTL
HALL OUT
HALL OFFSET
PHIR F
ZS 60
ZS 120
ZS 180
FD1
FD2
FD CLK
FS DA2
FC
-9V
ZD2
ZD1
PHIR Z
ZC
NON REG GND
NON REG GND
NON REG 6V
NON REG 6V
MOTOR DRIVE REGULATOR Q554 2SB1320
IC554
MM1247XF
MOTOR DRIVER (DIGITAL)
MOTOR DRIVER (ANALOG)
IC553
MM1179XF
MOTOR DRIVE REGULATOR Q553 2SB1320
CAPACITOR SWITCH Q555 UMG2
CAPACI TOR SWITCH Q556 UMG2
CAPACI TOR SWITCH Q557 UMG2
IRIS DRIVER Q551 2SC4617B
LENS POSITION DETECTER REFERENCE VOLTAGE GENERATOR
IC551
NJM2902V
IC552
NJM2902V
IRIS CONTROL IRISPOSITION DETECTER
HALL DEVICE DRIVER Q552 UMT2
SC15
N2247TA
LENS
AF O2
AF O2
AF O1
AF O1
DAMP (+)
DRIVE (-)
HALL OUT(+)
HALL IN(-)
HALL OUT(-)
HALL IN(+)
DRIVE (+)
DAMP (-)
ZM PHTR E
ZM LED
GND
AF LED
PHTR C
AF PHTR E
ZOOM O2
ZOOM O2
ZOOM O1
ZOOM O1
FOCUS MOTOR
IRIS METER
HALL DEVICE
ZOOM INTERRUPTER
ZOOM MOTOR
FOCUS INTERRUPTER
NEAR ⇙ TELE
FAR ⇗ WIDE
DUNTK2438PM00
QPWBX2438TAZZ

12-27. PAL JOG

▷▷PB C Signal



DUNTK4726HE00
QPWBX4726GEZZ

★ MARK: SPARE PARTS DELIVERY SECTION

13. *PARTS LIST*

PARTS REPLACEMENT

Replacement parts which have these special safety characteristics identified in this manual; electrical components having such features are identified by ⚠ in the Replacement Parts Lists.
The use of a substitute replacement part which does not have the same safety characteristics as the factory recommended replacement parts shown in this service manual may create shock, fire or other hazards.

"HOW TO ORDER REPLACEMENT PARTS"

To have your order filled promptly and correctly, please furnish the following informations.

1. MODEL NUMBER
2. REF. NO.
3. PART NO.
4. DESCRIPTION
5. CODE

• PWB Unit ..... Not Supplied.

⚠ MARK: SAFETY RELATED PARTS

Ref. No.	Part No.	★	Description	Code
PRINTED WIRING BOARD ASSEMBLY				
	DUNTK2435PM00		CCD P.W.B.	–
	DUNTK2436PM00		CDS P.W.B.	–
	DUNTK2437PM00		Camera P.W.B.	–
	DUNTK2438PM00		Lens Drive P.W.B.	–
	DSETU0288KE00		VCR and LCD PWB Ass'y	–
TUNER AND ASSEMBLY UNITS				
	RUNTK0291TAZZ		Inverter Trans Unit	
INTEGRATED CIRCUITS				
	VHiLZ23635/-1		I.C.	BQ
COIL AND TRANSFORMERS				
	PFiLW0058TAZZ		Filter	AW

Ref. No.	Part No.	★	Description	Code
DUNTK2435PM00 CCD P.W.B.				
INTEGRATED CIRCUITS				
IC2	VHi7AC1008B-1		74AC11008DB	AF
TRANSISTORS				
Q1	VS2SK160///-1		Transistor	AD
Q2	VS2SC4627CD-1		Transistor	AB
DIODES AND LED'S				
D1	VHDMA132K//-1		Diode	AA
CAPACITORS				
C1	VCSAPH1DJ225M		2.2µF 20V Tantalum, (N.P)	AB
C2, 6	VCKYCY1HF103Z		0.01µF 50V Ceramic	AA
C3	VCSATE1VJ335M		3.3µF 35V Tantalum, (N.P)	
C4	VCKYTV1CF105Z		1.0µF 16V Ceramic	AB
C5	VCKYCY1HB102K		1000pF 50V Ceramic	AA
C7	VCSATA1CJ225M		2.2µF 16V Tantalum, (N.P)	AC
C8	VCKYCY1CF104Z		0.1µF 16V Ceramic	AA
RESISTORS				
R2	VRS-CY1JF822J		8.2k 0.063W 5% Metal Oxide	AA
R3	VRS-CY1JF182J		1.8k 0.063W 5% Metal Oxide	AA
R4	VRS-CY1JF473J		47k 0.063W 5% Metal Oxide	AA
R5	VRS-CY1JF183J		18k 0.063W 5% Metal Oxide	AA
R6	VRS-CY1JF101J		100 0.063W 5% Metal Oxide	AA
R7	VRS-CY1JF104J		100k 0.063W 5% Metal Oxide	AA
R8	VRS-CY1JF303F		30k 0.063W 1% Metal Oxide	AA
R9	VRS-CY1JF123F		12k 0.063W 1% Metal Oxide	AA
MISCELLANEOUS PARTS				
SC1	QSOCN1747TAZZ		Socket	AE

★ MARK: SPARE PARTS DELIVERY SECTION

DUNTK2436PM00 CDS P.W.B.

INTEGRATED CIRCUITS

Ref. No.	Part No.	★	Description	Code
IC11	VHiLZ95D71M-1		I.C.	
IC12	VHiCXD1267N-1		I.C.	
IC101	VHiCA1390AR-1		CXA1390AR	AR
IC6601	VHiLA7471M/-1		LA7471M	

TRANSISTORS

Ref. No.	Part No.	★	Description	Code
Q14	VSUMZ1/////-1		Transistor	AB

DIODES AND LED'S

Ref. No.	Part No.	★	Description	Code
D11, 12, 13	VHDMA132K//-1		Diode	AA
D14	VHDDAN222//-1		Diode	AA
D15	RH-EX0152TAZZ		Zener Diode	

PACKAGED CIRCUITS

Ref. No.	Part No.	★	Description	Code
X11	RCRSZ0008TAZZ		Crystal	AR

COIL AND TRANSFORMERS

Ref. No.	Part No.	★	Description	Code
L14	VPABM1R0JR82N		Peaking 1µH 5%	AC
L101	VPAEM100K1R3N		Peaking 10µH 10%	AC
L6601	VP-NM101K4R2N		Peaking 100µH 10%	AC

CAPACITORS

Ref. No.	Part No.	★	Description	Code
C11, 6610, 6613	VCKYTV1EB104K		0.1µF 25V Ceramic	AB
C15	VCEAPE1HW105M		1.0µF 50V Electrolytic	AB
C16, 17	VCKYTV1HF104Z		0.1µF 50V Ceramic	AA
C18, 27, 114	VCKYCY1EF104Z		0.1µF 25V Ceramic	AA
C19	VCEAPE1EW335M		3.3µF 25V Electrolytic	
C20, 22, 23, 35, 36, 45, 102, 105, 108, 109,	VCKYCY1HF103Z		0.01µF 50V Ceramic	AA
C110, 113, 116	VCKYCY1HF103Z		0.01µF 50V Ceramic	AA
C21	VCEAPE1CW475M		4.7µF 16V Electrolytic	AB
C24, 42, 44, 6601, 6614	VCKYCY1HB102K		1000pF 50V Ceramic	AA
C37, 6612	VCSATA1AJ106M		10µF 10V Tantalum, (N.P)	
C38, 39, 40, 41	VCCCCY1HH470J		47pF 50V Ceramic	AA
C43	VCCCCY1HH6R0D		6.0pF 50V Ceramic	AA
C46	VCSATA1AJ475M		4.7µF 10V Tantalum, (N.P)	AC
C47, 111, 115, 6625	VCKYCY1CF104Z		0.1µF 16V Ceramic	AA
C101	VCSATE1AJ156M		15µF 10V Tantalum, (N.P)	AD
C103, 104	VCSAPD1DJ474M		0.47µF 20V Tantalum, (N.P)	AD
C106, 107	VCSAPD1CJ105M		1.0µF 16V Tantalum, (N.P)	AC
C112, 6628	VCKYCY1EB223K		0.022µF 25V Ceramic	AA
C6602, C6615	VCKYTV1EB333K VCKYTV1HB153K		0.033µF 25V Ceramic 0.015µF 50V Ceramic	
C6603, 6616	VCKYCY1CB333K		0.033µF 16V Ceramic	AA
C6605, 6620	VCKYCY1HB682K		6800pF 50V Ceramic	AA
C6607, 6611, 6618	VCKYTV1NF105Z		1.0µF 12V Ceramic	AB
C6608, 6609, 6621, 6622	VCKYCY1HB153K		0.015µF 50V Ceramic	AA
C6623	VCSAPD1AJ225M		2.2µF 10V Tantalum, (N.P)	AC
C6624	VCSAPK1AJ336M		33µF 10V Tantalum, (N.P)	
C6626, 6627, 6629	VCKYCY1EB103K		0.01µF 25V Ceramic	AA
C6630, 6631	VCKYCY1HB471K		470pF 50V Ceramic	AA

RESISTORS

Ref. No.	Part No.	★	Description	Code
R11, 51	VRS-CY1JF105J		1.0 0.063W 5% Metal Oxide	AA
R17, 24	VRS-CY1JF104J		100k 0.063W 5% Metal Oxide	AA
R20, 28, 6620	VRS-CY1JF103J		10k 0.063W 5% Metal Oxide	AA
R22	VRS-CY1JF224J		220k 0.063W 5% Metal Oxide	AA

★ MARK: SPARE PARTS DELIVERY SECTION

Ref. No.	Part No.	★	Description	Code
R23	VRS-CY1JF392J		3.9k 0.063W 5% Metal Oxide	AA
R25, 104	VRS-CY1JF153J		15k 0.063W 5% Metal Oxide	AA
R26, 59	VRS-CY1JF561J		560 0.063W 5% Metal Oxide	AA
R27, 54, 6601, 6611, 6626	VRS-CY1JF102J		1.0k 0.063W 5% Metal Oxide	AA
R48	VRS-CY1JF222J		2.2k 0.063W 5% Metal Oxide	AA
R52	VRS-CA1JF102J		1.0k 0.063W 5% Metal Oxide	AA
R101	VRS-CY1JF153F		15k 0.063W 1% Metal Oxide	AA
R102	VRS-CY1JF244F		240k 0.063W 1% Metal Oxide	AA
R105	VRS-CA1JF153J		15k 0.063W 5% Metal Oxide	
R108	VRS-CY1JF225J		2.2 0.063W 5% Metal Oxide	AA
R109	VRS-CY1JF272J		2.7k 0.063W 5% Metal Oxide	AA
R110	VRS-CY1JF223J		22k 0.063W 5% Metal Oxide	AA
R6604, 6614	VRS-CY1JF113J		11k 0.063W 5% Metal Oxide	AA
R6606, 6616	VRS-CY1JF563J		56k 0.063W 5% Metal Oxide	AA
R6607, 6617	VRS-CY1JF393J		39k 0.063W 5% Metal Oxide	AA
R6608, 6618	VRS-CY1JF123J		12k 0.063W 5% Metal Oxide	AA
R6609	VRS-CA1JF682J		6.8k 0.063W 5% Metal Oxide	AA
R6619	VRS-CY1JF824J		820k 0.063W 5% Metal Oxide	AA
R6622	VRS-CA1JF154J		150k 0.063W 5% Metal Oxide	
R6624	VRS-CY1JF154J		150k 0.063W 5% Metal Oxide	AA
R6625	VRS-CY1JF473J		47k 0.063W 5% Metal Oxide	AA

MISCELLANEOUS PARTS

FB11, 12, 13, 14, 15, 16, 17	RBLN-0059CEZZ		Balun	AB
FB18	RBLN-0062CEZZ		Balun	AC
FB6601, 6602	RBLN-0067CEZZ		Balun	AC
P3	QCNCM3652TAZZ		Connector	AF
P6601, 6602	QPLGN0363TAZZ		Plug	AC
SC2	QSOCN1747TAZZ		Socket	AE

Ref. No.	Part No.	★	Description	Code
DUNTK2437PM00 CAMERA P.W.B.				
INTEGRATED CIRCUITS				
IC151	VHiCXA1399Q-1		CXA1399Q	AT
IC152	VHiCA1507BR-1		CXA1507BR	BE
IC201	RH-iX0171TAZZ		HG51B143FB	BL
IC202	VHiTCVHC04S-1		TC74VHC04FS	
IC231	RH-iX0210TAZZ		I.C.	
IC241	VHiCXD1177Q-1		CXD1177Q	AS
IC271	RH-iX0172TAZZ		LR38183	
IC272	RH-iX0190TAZZ		I.C.	
IC273	VHiCK48324R-1		CXK48324R	
IC275	VHiMB8115011E		MB81C1501PF	BB
IC276	VHiL7A1208/-1		I.C.	
IC501	RH-iX0186TAZZ		I.C.	
IC502	VHiBR24C02F-1		BR24C02F	
IC503	VHiMB8346BV-1		MB88346BPFV	AN
IC504	VHiPST592iM-1		IC-PST592IMT	AE
IC505	VHiTCHT707F-1		TC74HCT7007AF	AD
IC506	VHiNJM79L091E		NJM79L09UD	AE
TRANSISTORS				
Q151	VS2SA1774F/-1		Transistor	AA
Q152, 244, 501	VS2SC4617B/-1		Transistor	AA
Q204	VS2SK94-X3/-1		Transistor	AC
Q205, 246	VSUMX2/////-1		Transistor	AB
Q242, 243	VSUMZ1/////-1		Transistor	AB
Q245	VS2SB1132Q/-1		Transistor	AC
DIODES AND LED'S				
D501	VHDQAP222//-1		Diode	AA
D502	VHDMA132K//-1		Diode	AA
PACKAGED CIRCUITS				
X202	RCRSZ0005TAZZ		Crystal	AU
COIL AND TRANSFORMERS				
CF501	RFiLC0052TAZZ		Filter	AE
FL202, 203	RFiLN0079CEZZ		Filter	AC
L206	VP-1M220K2R9N		Peaking 22µH 10%	AC
L242, 243, 501, 502	VPAEM100K1R3N		Peaking 10µH 10%	AC
L244	VPAEM680K6R9N		Peaking 68µH 10%	AC

★ MARK: SPARE PARTS DELIVERY SECTION

Ref. No.	Part No.	★	Description	Code
CAPACITORS				
C150, 156, 157, 158, 160, 165, 168, 169, 217, 219, 245, 254, 503, 504, 505, 512, 513, 515	VCKYCY1HF103Z		0.01µF 50V Ceramic	AA
C151, 255	VCSATE1AJ156M		15µF 10V Tantalum, (N.P)	AD
C152, 154, 161, 162, 201, 203, 209, 233, 234, 235, 242, 244, 261, 262, 263, 264, 265, 266, 271, 272, 273, 274, 277, 279, 280, 281, 283, 284, 285, 286, 288, 289, 290, 292, 295, 296, 508, 511	VCKYCY1CF104Z		0.1µF 16V Ceramic	AA
C155, 159, 202	VCSATA1AJ475M		4.7µF 10V Tantalum, (N.P)	AC
C163	VCSAPD1CJ105M		1.0µF 16V Tantalum, (N.P)	AC
C166, 211, 220, 232, 243, 275, 276, 278, 282, 287, 294, 501	VCSATA1AJ106M		10µF 10V Tantalum, (N.P)	
C167, 251, 256, 509	VCCCCY1HH150J		15pF 50V Ceramic	AA
C212, 231, 241, 502, 507	VCKYCY1EF104Z		0.1µF 25V Ceramic	AA
C213, 214	VCKYCY1HB102K		1000pF 50V Ceramic	AA
C218	VCKYTV1EB104K		0.1µF 25V Ceramic	AB
C246	VCSATA0JJ156M		15µF 6.3V Tantalum, (N.P)	
C247, 253, 257, 293	VCCCCY1HH100D		10pF 50V Ceramic	AA
C250	VCCCCY1HH101J		100pF 50V Ceramic	AA
C252, 260	VCKYTV1CF105Z		1.0µF 16V Ceramic	AB
C258	VCCCCY1HH470J		47pF 50V Ceramic	AA
C291	VCSATC1AJ226M		22µF 10V Tantalum, (N.P)	AE
C506	VCEAPE0JW106M		10µF 6.3V Electrolytic	AB
RESISTORS				
R152, 253, 254, 257, 262	VRS-CY1JF152J		1.5k 0.063W 5% Metal Oxide	AA
R153	VRS-CY1JF470J		47 0.063W 5% Metal Oxide	AA
R157, 224	VRS-CY1JF272J		2.7k 0.063W 5% Metal Oxide	AA
R158, 293, 504, 520, 1217	VRS-CY1JF101J		100 0.063W 5% Metal Oxide	AA
R162, 237, 239, 503, 522	VRS-CA1JF102J		1.0k 0.063W 5% Metal Oxide	AA
R163	VRS-CA1JF220J		22 0.063W 5% Metal Oxide	
R167, 1246	VRS-CY1JF822J		8.2k 0.063W 5% Metal Oxide	AA
R200, 236, 240, 531, 1202,	VRS-CY1JF000J		00 0.063W 5% Metal Oxide	AA

★ MARK: SPARE PARTS DELIVERY SECTION

Ref. No.	Part No.	★	Description	Code
R1209, 1210, 1251	VRS-CY1JF000J		00 0.063W 5% Metal Oxide	AA
R211, 248, 274, 278, 279, 282, 284, 285, 288, 289, 501, 502, 515, 517, 524, 525, 546, 1243	VRS-CY1JF103J		10k 0.063W 5% Metal Oxide	AA
R220, 251, 252, 263, 514, 538, 539, 1208, 1241	VRS-CY1JF102J		1.0k 0.063W 5% Metal Oxide	AA
R222	VRS-CY1JF331J		330 0.063W 5% Metal Oxide	AA
R238	VRS-CA1JF124J		120k 0.063W 5% Metal Oxide	AA
R241, 249, 250	VRS-CY1JF473J		47k 0.063W 5% Metal Oxide	AA
R242	VRS-CY1JF393J		39k 0.063W 5% Metal Oxide	AA
R243, 244	VRS-CY1JF201J		200 0.063W 5% Metal Oxide	AA
R245, 246	VRS-CY1JF104J		100k 0.063W 5% Metal Oxide	AA
R247, 255	VRS-CY1JF332J		3.3k 0.063W 5% Metal Oxide	AA
R256	VRS-CY1JF105J		1.0 0.063W 5% Metal Oxide	AA
R258, 259	VRS-CY1JF182J		1.8k 0.063W 5% Metal Oxide	AA
R260	VRS-CY1JF472J		4.7k 0.063W 5% Metal Oxide	AA
R264, 1250	VRS-CY1JF561J		560 0.063W 5% Metal Oxide	AA
R294, 513, 516, 529, 1242	VRS-CY1JF223J		22k 0.063W 5% Metal Oxide	AA
R518	VRS-CA1JF101J		100 0.063W 5% Metal Oxide	AA
R526, 1206	VRS-CY1JF222J		2.2k 0.063W 5% Metal Oxide	AA
R527	VRS-CA1JF223J		22k 0.063W 5% Metal Oxide	AA
R547	VRS-CY1JF244F		240k 0.063W 1% Metal Oxide	AA
R548	VRS-CY1JF153F		15k 0.063W 1% Metal Oxide	AA
R1203	VRS-CY1JF273J		27k 0.063W 5% Metal Oxide	AA
R1204	VRS-CA1JF103J		10k 0.063W 5% Metal Oxide	AA
R1205	VRS-CA1JF152J		1.5k 0.063W 5% Metal Oxide	AA
R1207	VRS-CY1JF274J		270k 0.063W 5% Metal Oxide	AA
R1211, 1212, 1213, 1214, 1215, 1216	VRK-SA1JF101J		100 0.063W 5% Metal Composition	AB
R1244	VRS-CY1JF471J		470 0.063W 5% Metal Oxide	AA
R1245	VRS-CY1JF183J		18k 0.063W 5% Metal Oxide	AA
R1247	VRS-CY1JF122J		1.2k 0.063W 5% Metal Oxide	AA
R1248	VRS-CY1JF392J		3.9k 0.063W 5% Metal Oxide	AA

MISCELLANEOUS PARTS

	PSLDM3155TAFW		Shield	AF
FB151, 203	RBLN-0006TAZZ		Balun	AB
FB152, 201, 202, 243, 244, 271, 272	RBLN-0007TAZZ		Balun	
FB204, 205, 206, 245	RBLN-0067CEZZ		Balun	AC
FB241, 242	RBLN-0059CEZZ		Balun	AB
J201	QJAKE0045TAZZ		Jack	AD
P11	QCNCM2648TAZZ		Connector	AE
SC7	QCNCW3652TAZZ		Connector	AF
SC8	QSOCN1648TAZZ		Socket	AE
SC9	QSOCN1448TAZZ		Socket	AE
SC10	QSOCN0336TAZZ		Socket	
SC12	QSOCN2447TAZZ		Socket	
SC13	QSOCN0738TAZZ		Socket	

DUNTK2438PM00 LENS DRIVE P.W.B.

INTEGRATED CIRCUITS

IC551, 552	VHiNJM2902V-1		NJM2902V	AD
IC553	VHiMM1179XF-1		I.C.	AK
IC554	VHiMM1247XF-1		I.C.	

★ MARK: SPARE PARTS DELIVERY SECTION

Ref. No.	Part No.	★	Description	Code
TRANSISTORS				
Q551	VS2SC4617B/-1		Transistor	AA
Q552	VSUMT2/////-1		Transistor	AB
Q553, 554	VS2SB1132Q/-1		Transistor	AC
Q555, 556, 557	VSUMG2/////-1		Transistor	AC
CAPACITORS				
C551, 564, 573, 578	VCKYCY1CF104Z		0.1µF 16V Ceramic	AA
C552, 553	VCSATA1AJ475M		4.7µF 10V Tantalum, (N.P)	AC
C554	VCKYCY1HB122K		1200pF 50V Ceramic	AA
C555, 556	VCCCCY1HH121J		120pF 50V Ceramic	AA
C557	VCKYCY1HB272K		2700pF 50V Ceramic	AA
C558, 560, 561, 572	VCKYCY1HF103Z		0.01µF 50V Ceramic	AA
C559	VCKYCY1CF224Z		0.22µF 16V Ceramic	AA
C562, 563	VCKYCY1CB333K		0.033µF 16V Ceramic	AA
C565, 574	VCSATE1AJ156M		15µF 10V Tantalum, (N.P)	AD
C566, 567, 568, 569, 570, 571, 581, 582	VCKYCY1CB473K		0.047µF 16V Ceramic	AA
C579, 580	VCCCCY1HH560J		56pF 50V Ceramic	AA
RESISTORS				
R551, 555	VRS-CA1JF103J		10k 0.063W 5% Metal Oxide	AA
R552, 556	VRS-CY1JF124J		120k 0.063W 5% Metal Oxide	AA
R553	VRS-CA1JF472J		4.7k 0.063W 5% Metal Oxide	AA
R554, 557	VRS-CA1JF223J		22k 0.063W 5% Metal Oxide	AA
R558	VRS-CY1JF682J		6.8k 0.063W 5% Metal Oxide	AA
R559	VRS-CY1JF225J		2.2ohm 0.063W 5% Metal Oxide	AA
R560	VRS-CA1JF333J		33k 0.063W 5% Metal Oxide	
R561	VRS-CY1JF393J		39k 0.063W 5% Metal Oxide	AA
R562, 563	VRS-CA1JF392J		3.9k 0.063W 5% Metal Oxide	AA
R564	VRS-CY1JF180J		18 0.063W 5% Metal Oxide	AA
R565	VRS-CY1JF103J		10k 0.063W 5% Metal Oxide	AA
R566	VRS-CA1JF121J		120 0.063W 5% Metal Oxide	
R567	VRS-CY1JF222J		2.2k 0.063W 5% Metal Oxide	AA
R568	VRS-CA1JF682J		6.8k 0.063W 5% Metal Oxide	AA
R569	VRS-CA1JF124J		120k 0.063W 5% Metal Oxide	AA
R570	VRS-CA1JF123J		12k 0.063W 5% Metal Oxide	
R571, 575	VRS-CY1JF912J		9.1k 0.063W 5% Metal Oxide	AA
R572, 576	VRS-CY1JF562J		5.6k 0.063W 5% Metal Oxide	AA
R573, 577	VRS-CY1JF821J		820 0.063W 5% Metal Oxide	AA
R574, 596	VRS-CY1JF391J		390 0.063W 5% Metal Oxide	AA
R580	VRS-CY1JF000J		00 0.063W 5% Metal Oxide	AA
MISCELLANEOUS PARTS				
SC14	QSOCN2447TAZZ		Socket	
SC15	QSOCN2247TAZZ		Socket	AF

DSEDU0288KE00 VCR P.W.B.

Ref. No.	Part No.	★	Description	Code
INTEGRATED CIRCUITS				
IC301	VHiHA118167-1		HA118167F	AR
IC701	RH-iX0214TAZZ		I.C.	
IC702	VHiS8420HF/-1		S-8420HF	AL
IC703	VHiS2917iF/-1		S-2917IF10	
IC704	RH-iX0194TAZZ		UPD6461GS-614	
IC900	VHiMB3785V/-1		MB3785APFV	AQ
IC901	VHiMB3775FV-1		MB3775PFV	AH
IC1701	RH-iX0198TAZZ		I.C.	
IC1702	VHiXR10823/-1		I.C.	
IC1703	VHiXR10358F-1		XRA10358F-T1	AC
IC1704	VHiLB1841V/-1		LB1841V	AM
IC1705	VHiLB1881V/-1		LB1881V	AM
IC1706	VHiLB1880B/-1		I.C.	
IC1707	VHiNJM2902V-1		NJM2902V	AD
IC1708	VHiSC7S04F/-1		SC7S04F	
IC3401	VHiTA75S393-1		I.C.	
IC3402	VHiCA1509AR-1		I.C.	
TRANSISTORS				
Q301, 3411, 3420	VSDTA114EE/-1		Transistor	AB
Q302, 303,	VSXP6501///-1		Transistor	AB

★ MARK: SPARE PARTS DELIVERY SECTION

Ref. No.	Part No.	★	Description	Code
Q304, 305, 310, 1701, 3406, 3417	VSXP6501///-1		Transistor	AB
Q306	VSUMG2/////-1		Transistor	AC
Q307, 311, 3400, 3405, 3408, 3409, 3410	VS2SC4617B/-1		Transistor	AA
Q308, 309, 3402, 3403, 3404, 3413, 3416	VS2SC3931C/-1		Transistor	AB
Q312, 313	VSXP1113///-1		Transistor	AB
Q314, 315	VSXP6401///-1		Transistor	AB
Q701	VSXP4111///-1		Transistor	AB
Q703	VSXP4311///-1		Transistor	
Q901, 902, 915	VSFP101////-1		Transistor	AD
Q903, 907	VS2SB1302S/-1		Transistor	AD
Q904, 914	VS2SD2216//-1		Transistor	AA
Q905	VS2SA1298Y/-1		Transistor	AB
Q906	VS2SB12956/-1		Transistor	AB
Q908, 1708	VS2SB1121T/-1		Transistor	AC
Q909	VS2SC4116Y/-1		Transistor	AB
Q912	VSXP4213///-1		Transistor	AB
Q913	VSXP4113///-1		Transistor	AA
Q917	VSFMY1/////-1		Transistor	AB
Q918	VSXP4601///-1		Transistor	AB
Q919	VSFP301////-1		Transistor	
Q1301, 3415	VSDTC144EE/-1		Transistor	AA
Q1302, 1304	VS2SA1037KQ-1		Transistor	AA
Q1303, 1709, 3407	VSDTA144EE/-1		Transistor	AA
Q3401, 3414	VS2SA1774F/-1		Transistor	AA
Q3418, 3419	VSUMX2/////-1		Transistor	AB

DIODES AND LED'S

D701, 702, 704, 1701, 1702, 1703	VHDDAN222//-1		Diode	AA
D703	VHDDA221///-1		Diode	AB
D900	VHDSFPB54//2E		Diode	AC
D901	VHDFC903///-1		Diode	AB
D904	VHDMA132K//-1		Diode	AA
D3400	VHDMA147///-1		Diode	AB

PACKAGED CIRCUITS

X701	RCRSC0032TAZZ		Crystal	
X1701	RCRSC0033TAZZ		Crystal	

COIL AND TRANSFORMERS

CF701	RFILC0053TAZZ		Filter	
CF900	RFILC0044TAZZ		Filter	AE
FL701	RCILB0039TAZZ		Oscillation Coil	AE
L301, 302, 3403, 3421	VP-NM101K4R2N		Peaking 100µH 10%	AC
L303, 304, 305, 306, 3416	VP-1M221J170N		Peaking 220µH 5%	AB
L307	VP-1M181J130N		Peaking 180µH 5%	AB
L701, 702, 920, 1701, 1703, 1704	VP-NM220K1R0N		Peaking 22µH 10%	AB
L900	RCILP0176TAZZ		Coil	AE
L901	RCILP0188TAZZ		Coil	
L902	VP-WM2R2MR13N		Peaking 2.2µH 20%	AB
L903, 907, 908, 909	VP-NM100KR42N		Peaking 10µH 10%	AB
L904, 905, 913	VP-WM4R7MR20N		Peaking 4.7µH 20%	AB
L906, 911, 914	RCILP0157TAZZ		Coil	AE
L912, 915, 916, 917	RCILP0159TAZZ		Coil	AF
L1301, 3414	VPABM100J2R6N		Peaking 10µH 5%	AC
L1302	VPABM101J160N		Peaking 100µH 5%	AC
L1702	VP-1M471J310N		Peaking 470µH 5%	AC
L3404	VPABM680J120N		Peaking 68µH 5%	AC
L3405, 3406	VP-1M271J220N		Peaking 270µH 5%	
L3409	VP-NM470K2R0N		Peaking 47µH 10%	AB
L3410, 3413, 3420	VPABM180J3R6N		Peaking 18µH 5%	AC
L3412	VPABM470J8R3N		Peaking 47µH 5%	AC
L3415	VPABM820J140N		Peaking 82µH 5%	AC
L3419	VPABM3R3J1R4N		Peaking 3.3µH 5%	AC

★ MARK: SPARE PARTS DELIVERY SECTION

Ref. No.	Part No.	★	Description	Code
L3440	VPABM5R6J1R9N		Peaking 5.6µH 5%	AC
⚠ T900	RTRNZ0079TAZZ		Transformer	
	CAPACITORS			
C301	VCKYTV1CF224Z		0.22µF 16V Ceramic	AB
C302, 331, 332, 333, 334	VCKYTV1CF334Z		0.33µF 16V Ceramic	AB
C303	VCSATC1CJ336M		33µF 16V Tantalum, (N.P)	
C304	VCEAPF0JW226M		22µF 6.3V Electrolytic	AB
C305, 321	VCKYCY1CF473Z		0.047µF 16V Ceramic	AA
C306, 319, 323, 329	VCKYCY1EF223Z		0.022µF 25V Ceramic	AA
C307, 312, 313, 320, 322, 336, 337, 338, 339, 701, 1704, 1735, 3403, 3418, 3420, 3421, 3453, 3455, 3456, 3457, 3459, 3461, 3469, 3470, 3471, 3472, 3474	VCKYCY1HF103Z		0.01µF 50V Ceramic	AA
C308, 311, 314, 317, 324, 325, 326, 327, 1716, 3424, 3425, 3428, 3429, 3430, 3435, 3438, 3446, 3452,	VCKYCY1EB103K		0.01µF 25V Ceramic	AA

Ref. No.	Part No.	★	Description	Code
C3458, 3464, 3465	VCKYCY1EB103K		0.01µF 25V Ceramic	AA
C309, 3401	VCCCCY1HH271J		270pF 50V Ceramic	AA
C702, 704, 706, 725, 726, 932, 1305, 1307, 1710	VCKYCY1CF104Z		0.1µF 16V Ceramic	AA
C703, 1739, 1740	VCEAPH1CW106M		10µF 16V Electrolytic	AB
C705, 707, 708, 1703, 1736, 3417, 3433, 3440	VCSATA1AJ106M		10µF 10V Tantalum, (N.P)	
C709, 710, 717, 720, 904, 931, 933, 934, 935, 942, 952, 991, 995, 1701, 1706, 1707, 1713, 1722, 1749, 1752, 1781, 1783, 1784, 9903, 9906	VCKYTV1NF105Z		1.0µF 12V Ceramic	AB
C711, 719, 900, 901, 912, 913, 914, 915, 917, 1717, 1720, 1721, 9908	VCKYCY1HB102K		1000pF 50V Ceramic	AA
C712	VCKYTQ1CB334K		0.33µF 16V Ceramic	AB
C713, 3423	VCCCCY1HH120J		12pF 50V Ceramic	AA
C714, 3436	VCCCCY1HH7R0D		7.0pF 50V Ceramic	AA

★ MARK: SPARE PARTS DELIVERY SECTION

Ref. No.	Part No.	★	Description	Code
C718, 721	VCSATA1AJ475M		4.7µF 10V Tantalum, (N.P)	AC
C724	VCSATA0JJ475M		4.7µF 6.3V Tantalum, (N.P)	AC
C903, 1788	VCKYCY1HB472K		4700pF 50V Ceramic	AA
C905, 910, 948, 1714, 1719, 1780, 9904, 9905, 9910, 9911, 9912	VCKYTV1EB104K		0.1µF 25V Ceramic	AB
C906, 907, 3460	VCCCCY1HH471J		470pF 50V Ceramic	AA
C908	VCCCCY1HH331J		330pF 50V Ceramic	AA
C909	VCKYTV1CF104Z		0.1µF 16V Ceramic	AA
C911, 1728, 3439, 3441	VCKYCY1CB473K		0.047µF 16V Ceramic	AA
C918	VCKYCY1HB331K		330pF 50V Ceramic	AA
C922, 925, 926, 928, 929, 937, 941, 949, 951	RC-CZ0008TAZZ		Capacitor	AE
C927	VCKYCY1HB271K		270pF 50V Ceramic	AA
C938, 943, 9909	RC-CZ0012TAZZ		Capacitor	AE
C939, 940, 944, 1790	VCKYTV1EF104Z		0.1µF 25V Ceramic	AB
C953, 1741, 1746, 1753, 3416	VCKYTV1CF105Z		1.0µF 16V Ceramic	AB
C960, 3443	VCCCCY1HH221J		220pF 50V Ceramic	AA
C990	VCEAPT1CN226M		22µF 16V Electrolytic	AC
C996, 1705	VCKYCY1HB152K		1500pF 50V Ceramic	AA
C1301, 1711, 1734, 1742, 1750, 1751, 1755, 3426, 3462, 3486	VCKYCY1EF104Z		0.1µF 25V Ceramic	AA
C1302	VCCCCY1HH151J		150pF 50V Ceramic	AA
C1303, 1304, 1785,	VCCCCY1HH101J		100pF 50V Ceramic	AA
C1786, 3463	VCCCCY1HH101J		100pF 50V Ceramic	AA
C1702	VCCCCY1HH270J		27pF 50V Ceramic	AA
C1708, 1709, 9907	VCKYCY1HB471K		470pF 50V Ceramic	AA
C1712	VCKYCY1HB222K		2200pF 50V Ceramic	AA
C1718	VCKYCY1HB682K		6800pF 50V Ceramic	AA
C1727	VCKYTV1HB473K		0.047µF 50V Ceramic	AA
C1729, 1730, 1731, 3400	VCKYCY1HB103K		0.01µF 50V Ceramic	AA
C1737, 1738, 3422, 3432	VCCCCY1HH150J		15pF 50V Ceramic	AA
C1743	VCKYTV1CB224K		0.22µF 16V Ceramic	AB
C1744	VCKYTV1EB273K		0.027µF 25V Ceramic	AA
C1745, 1747	VCSATE1CJ106M		10µF 16V Tantalum, (N.P)	AD
C1754	VCSATA1CJ335M		3.3µF 16V Tantalum, (N.P)	AC
C1756, 1757, 1758	VCKYCY1HF333Z		0.033µF 50V Ceramic	AA
C1759	VCKYTV1CF225Z		2.2µF 16V Ceramic	AC
C1782	VCKYTV1EB683K		0.068µF 25V Ceramic	AB
C1787	VCKYCY1HB332K		3300pF 50V Ceramic	AA
C1789	VCKYTV1HF104Z		0.1µF 50V Ceramic	AA
C3402	VCCCCY1HH820J		82pF 50V Ceramic	AA
C3404, 3450, 3451	VCCCCY1HH680J		68pF 50V Ceramic	AA
C3406	VCKYCY1HB562K		5600pF 50V Ceramic	AA
C3407, 3419, 3431, 3466	VCCCCY1HH330J		33pF 50V Ceramic	AA
C3408	VCSATE1AJ226M		22µF 10V Tantalum, (N.P)	
C3427, 3434, 3475	VCKYCY1EB223K		0.022µF 25V Ceramic	AA
C3437	VCCCCY1HH180J		18pF 50V Ceramic	AA
C3442, 3449	VCCCCY1HH121J		120pF 50V Ceramic	AA
C3454	VCCCCY1HH5R0C		5.0pF 50V Ceramic	AA
C3473	VCCCCY1HH220J		22pF 50V Ceramic	AA
C9901	RC-CZ0010TAZZ		Capacitor	AC
C9902	VCSAPD1AJ225M		2.2µF 10V Tantalum, (N.P)	AC

RESISTORS

R301, 302, 303, 304, 3425, 3438, 3468	VRS-CY1JF183J		18k 0.063W 5% Metal Oxide	AA
R305	VRS-CY1JF181J		180 0.063W 5% Metal Oxide	AA

★ MARK: SPARE PARTS DELIVERY SECTION

Ref. No.	Part No.	★	Description	Code
R306, 313, 314, 317, 318, 3403, 3408, 3443, 3463	VRS-CY1JF331J		330 0.063W 5% Metal Oxide	AA
R307, 326, 710, 712, 713, 738, 750, 751, 752, 753, 754, 1718, 1746, 1751, 1767, 1783, 1784, 1789, 1791, 1794, 1797, 3404, 3440, 3448, 3449, 3450, 3451, 3455, 3464, 3471	VRS-CY1JF102J		1.0k 0.063W 5% Metal Oxide	AA
R308, 3441, 3495, 3496	VRS-CY1JF101J		100 0.063W 5% Metal Oxide	AA
R309, 315, 321, 324, 1305, 3452, 3494	VRS-CY1JF221J		220 0.063W 5% Metal Oxide	AA
R310	VRS-CY1JF100F		10 0.063W 1% Metal Oxide	AA
R311, 312, 319, 320, 914, 919, 943, 1756, 3415, 3481, 3488	VRS-CY1JF332J		3.3k 0.063W 5% Metal Oxide	AA
R316, 335, 1306, 1308, 1707, 1709, 1711, 1714, 1715, 1727, 1728, 1792, 3406, 3459, 3460	VRS-CY1JF223J		22k 0.063W 5% Metal Oxide	AA
R322, 332, 333, 334, 336, 337, 343, 931, 952, 1743, 3480	VRS-CY1JF562J		5.6k 0.063W 5% Metal Oxide	AA
R323, 711, 716, 719, 721, 724, 729, 730, 734, 735, 923, 993, 1706, 1717, 1720, 1722, 1769, 1772, 1776, 1777, 1778, 3429, 3473	VRS-CY1JF103J		10k 0.063W 5% Metal Oxide	AA
R325, 327, 328, 329, 330, 1757, 3433, 3472, 3476	VRS-CY1JF222J		2.2k 0.063W 5% Metal Oxide	AA
R338	VRS-CA1JF563J		56k 0.063W 5% Metal Oxide	
R340, 969, 3432	VRS-CY1JF563J		56k 0.063W 5% Metal Oxide	AA
R341, 3482	VRS-CY1JF154J		150k 0.063W 5% Metal Oxide	AA
R342, 1763, 1764, 1765, 1766, 3412, 3462	VRS-CY1JF471J		470 0.063W 5% Metal Oxide	AA

★ MARK: SPARE PARTS DELIVERY SECTION

Ref. No.	Part No.	★	Description	Code
R701	VRS - CY1JF243J		24k 0.063W 5% Metal Oxide	AA
R702, 1716	VRS - CY1JF123J		12k 0.063W 5% Metal Oxide	AA
R703, 968, 1740, 9901	VRS - CY1JF473J		47k 0.063W 5% Metal Oxide	AA
R704, 714, 9912	VRS - CY1JF334J		330k 0.063W 5% Metal Oxide	AA
R705, 994, 1710	VRS - CY1JF472J		4.7k 0.063W 5% Metal Oxide	AA
R706, 1721, 3466	VRS - CY1JF122J		1.2k 0.063W 5% Metal Oxide	AA
R707, 1701, 1796, 3411, 3491	VRS - CY1JF000J		00 0.063W 5% Metal Oxide	AA
R708, 1702	VRS - CA1JF102J		1.0k 0.063W 5% Metal Oxide	AA
R715, 732, 903, 1723, 1724, 1793, 1795, 1799, 9909	VRS - CY1JF104J		100k 0.063W 5% Metal Oxide	AA
R717, 722, 725, 1703, 1770, 1771	VRS - CA1JF103J		10k 0.063W 5% Metal Oxide	AA
R720, 3400	VRS - CY1JF822J		8.2k 0.063W 5% Metal Oxide	AA
R731, 911, 912, 915, 920, 936, 986, 997, 1307, 3407, 3483, 9904, 9905, 9908, 9910	VRS - CY1JF333J		33k 0.063W 5% Metal Oxide	AA
R733, 3405, 3410, 3435, 3457, 3465, 3489	VRS - CY1JF152J		1.5k 0.063W 5% Metal Oxide	AA
R736, 948, 1768	VRS - CY1JF474J		470k 0.063W 5% Metal Oxide	AA
R737, 1719,	VRS - CY1JF823J		82k 0.063W 5% Metal Oxide	AA
R1731, 1735, 9902	VRS - CY1JF823J		82k 0.063W 5% Metal Oxide	AA
R739, 937, 3401, 3424, 3431	VRS - CY1JF153J		15k 0.063W 5% Metal Oxide	AA
R740	VRS - CA1JF153J		15k 0.063W 5% Metal Oxide	
R743, 1713, 3426, 3434, 3437, 3461, 3492	VRS - CY1JF272J		2.7k 0.063W 5% Metal Oxide	AA
R744	VRS - CA1JF272J		2.7k 0.063W 5% Metal Oxide	
R902, 904, 907, 908	VRN - CY1JF472D		4.7k 0.063W 0.5% Metal Film	AA
R905, 996, 1781, 3439	VRS - CY1JF273J		27k 0.063W 5% Metal Oxide	AA
R909, 970, 1704, 1705	VRS - CY1JF105J		1.0 0.063W 5% Metal Oxide	AA
R910, 1780, 3487	VRS - CY1JF682J		6.8k 0.063W 5% Metal Oxide	AA
R916, 9913	VRS - TV1JD271J		270 0.063W 5% Metal Oxide	AA
R917, 941 991	VRS - TV1JD471J		470 0.063W 5% Metal Oxide	AA
R918	VRS - TV1JD221J		220 0.063W 5% Metal Oxide	AA
R921, 938, 3474, 3475, 3490	VRS - CY1JF392J		3.9k 0.063W 5% Metal Oxide	AA
R924	VRS - TV1JD102J		1.0k 0.063W 5% Metal Oxide	AA
R930, 3402, 3414, 3453	VRS - CY1JF681J		680 0.063W 5% Metal Oxide	AA
R932, 3423, 3428, 3467	VRS - CY1JF182J		1.8k 0.063W 5% Metal Oxide	AA
R934	VRN - CY1JF223D		22k 0.063W 0.5% Metal Film	AA
R935	VRN - CY1JF752D		7.5k 0.063W 0.5% Metal Film	AA
R939	VRS - TV1JD2R2J		2.2 0.063W 5% Metal Oxide	AA
R940	VRS - TV1JD821J		820 0.063W 5% Metal Oxide	AA
R942	VRS - CY1JF303F		30k 0.063W 1% Metal Oxide	AA
R944	VRS - CY1JF682F		6.8k 0.063W 1% Metal Oxide	AA

★ MARK: SPARE PARTS DELIVERY SECTION

Ref. No.	Part No.	★	Description	Code
R945	VRS-CY1JF273F		27k 0.063W 1% Metal Oxide	AA
R946	VRS-TV1JD681J		680 0.063W 5% Metal Oxide	AA
R949	VRS-CY1JF824J		820k 0.063W 5% Metal Oxide	AA
R950	VRN-CY1JF153D		15k 0.063W 0.5% Metal Film	AA
R951	VRN-CY1JF912D		9.1k 0.063W 0.5% Metal Film	AA
R955	VRS-CY1JF272F		2.7k 0.063W 1% Metal Oxide	AA
R956, 1708, 1739	VRS-CY1JF683J		68k 0.063W 5% Metal Oxide	AA
R1301	VRS-CY1JF330J		33 0.063W 5% Metal Oxide	AA
R1302	VRS-CY1JF560J		56 0.063W 5% Metal Oxide	AA
R1303, 3409, 3427, 3442, 3456, 3458, 3493	VRS-CY1JF561J		560 0.063W 5% Metal Oxide	AA
R1304, 3454	VRS-CY1JF271J		270 0.063W 5% Metal Oxide	AA
R1712, 1787	VRS-CY1JF394J		390k 0.063W 5% Metal Oxide	AA
R1725, 1726	VRS-CY1JF201J		200 0.063W 5% Metal Oxide	AA
R1732, 1737	VRS-CY1JF202J		2.0k 0.063W 5% Metal Oxide	AA
R1734	VRS-CY1JF564J		560k 0.063W 5% Metal Oxide	AA
R1742, 1744, 1745, 1749, 1762, 1788	VRS-CY1JF393J		39k 0.063W 5% Metal Oxide	AA
R1747	VRS-CY1JF513J		51k 0.063W 5% Metal Oxide	AA
R1750, 3430, 3469, 3478	VRS-CY1JF821J		820 0.063W 5% Metal Oxide	AA
R1752, 1753	VRS-TQ2BD1R0J		1.0 1/8W 5% Metal Oxide	AA
R1758, 1759, 1760	VRS-CY1JF2R2J		2.2 0.063W 5% Metal Oxide	AA
R1773	VRS-TV1JD561J		560 0.063W 5% Metal Oxide	AA
R1774, 1775	VRS-TV1JD1R0J		1.0 0.063W 5% Metal Oxide	AA
R1779	VRS-CY1JF680J		68 0.063W 5% Metal Oxide	AA
R1782	VRS-CY1JF184J		180k 0.063W 5% Metal Oxide	AA
R3436	VRS-CY1JF121J		120 0.063W 5% Metal Oxide	AA
R3470, 3477, 9918	VRS-CY1JF391J		390 0.063W 5% Metal Oxide	AA
R7801	VRS-TV1JD103J		10k 0.063W 5% Metal Oxide	AA
R9903	VRS-CY1JF752J		7.5k 0.063W 5% Metal Oxide	AA
R9906, 9914	VRS-CY1JF103F		10k 0.063W 1% Metal Oxide	AA
R9907	VRS-CY1JF122F		1.2k 0.063W 1% Metal Oxide	AA
R9911	VRS-CY1JF124J		120k 0.063W 5% Metal Oxide	AA
R9915	VRS-CY1JF392F		3.9k 0.063W 1% Metal Oxide	AA
R9916, 9917	VRN-CY1JF333D		33k 0.063W 0.5% Metal Film	

MISCELLANEOUS PARTS

FB900	RBLN-0009TAZZ		Balun	AB
⚠ F901,	QFS-L1621TAZZ		Fuse	AE
⚠ 902				
⚠ F903	QFS-L1021TAZZ		Fuse	AE
P27, 28, 33	QPLGN0263TAZZ		Plug	AB
P35	QCNCM1652TAZZ		Connector	AD
P36	QPLGN0463TAZZ		Plug	AC
SC23, 34	QSOCN1648TAZZ		Socket	AE
SC24	QSOCN1448TAZZ		Socket	AE
SC25	QSOCN0638TAZZ		Socket	AD
SC26	QSOCN0361TAZZ		Socket	AD
SC29	QSOCN1247TAZZ		Socket	AE
SC30	QSOCN1847TAZZ		Socket	AE
SC31	QSOCN1747TAZZ		Socket	AE
SC32	QSOCN0647TAZZ		Socket	AE

DSETU0288KE00 LCD P.W.B.

INTEGRATED CIRCUITS

IC401	VHiCXA1810R-1		I.C.	
IC402, 1403	VHiTC4W53F/-1		TC4W53F	AE
IC403, 404	VHiCXL1506N-1		CXL1506N	
IC405	VHiBA7655AF-1		BA7655AF	
IC406	VHiCXA1211M-1		CXA1211M	AH
IC601	VHiTC4W66F/-1		TC4W66F	AE
IC602, 803	VHiNJM2107F-1		NJM2107F	AE
IC603	VHiHA118276-1		HA118276F	AW
IC800	VHiiR3Y21//-1		I.C.	AU
IC801	RH-iX2089CEZZ		LZ93N82	AR
IC804	VHiNJM2904M-1		NJM2904M	AE
IC1401	VHiMC13400F-1		MC13400FU	AN
IC1402	VHiNJM2244M-1		NJM2244M	AG
IC2401	VHiM52358VP-1		M52358VP	AS
IC5401, 5403	VHiMB88346BV-1		MB88346BPFV	AN
IC5402	VHiM62353GP-1		M62353GP	AN
IC6401	VHiNJM4560M-1		NJM4560M	AG
IC6402	VHiM5222FP/-1		M5222FP	AG
IC6403	VHiTDA7052A-1		TDA7052AT	AK

★ MARK: SPARE PARTS DELIVERY SECTION

Ref. No.	Part No.	★	Description	Code
TRANSISTORS				
Q401, 403, 404, 405, 406, 407, 408, 410, 412, 414, 417, 423, 425, 428, 432, 438, 446, 448, 454, 455, 1403, 2402, 2410, 2420	VS2SC4617B/-1		Transistor	AA
Q402, 429, 430, 445, 449, 453, 1401, 1405	VS2SA1774F/-1		Transistor	AA
Q409, 416, 435, 2401, 2406	VSRN2104///-1		Transistor	AA
Q411	VS2SD602A//-1		Transistor	AB
Q413, 444, 606, 814, 815, 816, 1402, 1404, 6401, 6403	VSDTC144EE/-1		Transistor	AA
Q415, 434	VSRN1104///-1		Transistor	AA
Q418	VSUMA2/////-1		Transistor	AB
Q419	VSUMG2/////-1		Transistor	AC
Q424, 433	VS2SC3931C/-1		Transistor	AB
Q437, 2403	VS2SC4738Y/-1		Transistor	AA
Q439, 605, 609, 813	VSDTA144EE/-1		Transistor	AA
Q441, 442	VS2SC4555-6-1		Transistor	AB
Q450	VS2SA1577R/-1		Transistor	AB
Q451	VSUMW1/////-1		Transistor	AB
Q452, 2407,	VSXP4213///-1		Transistor	AB
Q2408	VSXP4213///-1		Transistor	AB
Q601	VSRN4604///-1		Transistor	AB
Q602, 603, 6405, 6406	VSDTC323TK/-1		Transistor	AB
Q604	VSUMT2/////-1		Transistor	AB
Q608	VSUMX2/////-1		Transistor	AB
Q801, 803, 804	VSXP4601///-1		Transistor	AB
Q808	VS2SD2216//-1		Transistor	AA
Q2409	VSXP6501///-1		Transistor	AB
Q6402	VSRN2427///-1		Transistor	
DIODES AND LED'S				
D401, 1401, 2401, 2402	VHDMA132WK/-1		Diode	AA
D402, 1402, 1403, 1404, 1405, 1406	VHDMA133///-1		Diode	AB
D403, 806, 816, 817	VHDHVM17-5/-1		Diode	AD
D802	RH-EX0626CEZZ		Zener Diode	AB
D804, 808	VHDMA132K//-1		Diode	AA
D805	RH-EX0226CEZZ		Zener Diode	AB
D809	VHDMA147///-1		Diode	AB
PACKAGED CIRCUITS				
TH401, 801	VHHNTA20234-1		Thermistor	AC
X401	RCRSC0041TAZZ		Crystal	
X800	RCRSZ0011TAZZ		Crystal	
COIL AND TRANSFORMERS				
FL401	RCiLF0308TAZZ		Coil	AF
FL402, 403	RCiLF0312TAZZ		Coil	AL
FL404	RCiLF0318TAZZ		Coil	
FL405	RCiLF0319TAZZ		Coil	
FL601	RCiLF0279TAZZ		Coil	AL
FL602	RCiLF0298TAZZ		Coil	AL
FL800	RCiLi0320TAZZ		IF Coil	AE
L401, 402, 2404	VPABM5R6J1R9N		Peaking 5.6µH 5%	AC
L403	VPABM101J160N		Peaking 100µH 5%	AC
L404,	VPABM3R3J1R4N		Peaking 3.3µH 5%	AC

★ MARK: SPARE PARTS DELIVERY SECTION

Ref. No.	Part No.	★	Description	Code
L416	VPABM3R3J1R4N		Peaking 3.3µH 5%	AC
L405	VPABM560J9R1N		Peaking 56µH 5%	AC
L409, 410, 417, 800, 801, 1401, 1402, 5401	VP-NM470K2R0N		Peaking 47µH 10%	AB
L411	VP-WM470K1R3N		Peaking 47µH 10%	AB
L414, 415, 6402	VP-WM220KR71N		Peaking 22µH 10%	AB
L419	VPABM6R8J2R0N		Peaking 6.8µH 5%	AC
L601, 602, 2401	VP-NM101K4R2N		Peaking 100µH 10%	AC
L802, 803	VP-NM100KR42N		Peaking 10µH 10%	AB
L805	VP-1M150J2R2N		Peaking 15µH 5%	AC
L806	VPABM100J2R6N		Peaking 10µH 5%	AC
L807	VPABM220J4R1N		Peaking 22µH 5%	AC
L808, 809	VPABM120J2R9N		Peaking 12µH 5%	AC
L810	VPABM1R2JR90N		Peaking 1.2µH 5%	
L811	VP-1M470J5R4N		Peaking 47µH 5%	AC
L812	VP-QM100KR33N		Peaking 10µH 10%	
L2403	VP-1M100J1R6N		Peaking 10µH 5%	AC
L2405	VPABM2R2J1R2N		Peaking 2.2µH 5%	
L2409	VP-1M471J310N		Peaking 470µH 5%	AC

CAPACITORS

Ref. No.	Part No.	★	Description	Code
C401, 472, 853, 854	VCCCCY1HH331J		330pF 50V Ceramic	AA
C402, 861, 2414	VCCCCY1HH121J		120pF 50V Ceramic	AA
C403, 416, 875	VCCCCY1HH391J		390pF 50V Ceramic	AA
C404, 2454	VCCCCY1HH180J		18pF 50V Ceramic	AA
C405, 858	VCKYCY1HB561K		560pF 50V Ceramic	AA
C406, 434, 457, 463, 467, 476, 480, 494, 495, 1419	VCSATA0JJ106M		10µF 6.3V Tantalum, (N.P)	AD
C407	VCCCCY1HH270J		27pF 50V Ceramic	AA
C408	VCCCCY1HH470J		47pF 50V Ceramic	AA
C409, 422, 437, 441, 492,	VCKYTV1NF105Z		1.0µF 12V Ceramic	AB
C607, 608, 609, 610, 637, 641, 649, 654, 655, 661, 662, 668, 674, 681, 1413, 6409, 6410, 6416	VCKYTV1NF105Z		1.0µF 12V Ceramic	AB
C410, 415, 417, 420, 423, 430, 432, 438, 439, 440, 443, 452, 458, 460, 461, 474, 477, 485, 490, 497, 606, 611, 614, 620, 622, 625, 627, 631, 633, 634, 635, 636, 643, 650, 656, 659, 665, 670, 671, 800, 801, 802, 803, 804, 805, 806, 807, 808, 809, 810,	VCKYCY1HF103Z		0.01µF 50V Ceramic	AA

★ MARK: SPARE PARTS DELIVERY SECTION

Ref. No.	Part No.	★	Description	Code	Ref. No.	Part No.	★	Description	Code
C812, 819, 825, 827, 843, 872, 876, 893, 1402, 1404, 1406, 1408, 1416, 1420, 2402, 2420, 2421, 2422, 2423, 2424, 2427, 2429, 2452, 4401, 4404, 4412, 4413, 4415, 4416, 4417, 4421, 4422, 6411	VCKYCY1HF103Z		0.01µF 50V Ceramic	AA	C4400, 5402, 5403, 5404	VCKYCY1CF104Z		0.1µF 16V Ceramic	AA
C411, 657, 1417, 6406	VCEAPF0JW476M		47µF 6.3V Electrolytic	AB	C429, 449	VCSAPD0JJ335M		3.3µF 6.3V Tantalum, (N.P)	AC
C418, 436, 473, 651, 664, 850, 5702	VCCCCY1HH471J		470pF 50V Ceramic	AA	C431, 447, 450, 478, 486, 487, 493, 1409, 4405	VCSATA1AJ106M		10µF 10V Tantalum, (N.P)	
C425, 426, 427, 428, 444, 445, 446, 448, 604, 605, 828, 835, 836, 837, 838, 841, 842, 859, 869, 870, 884, 1407, 1418, 2413,	VCKYCY1CF104Z		0.1µF 16V Ceramic	AA	C433, 864, 2426	VCCCCY1HH680J		68pF 50V Ceramic	AA
					C435, 498	VCCCCY1HH820J		82pF 50V Ceramic	AA
					C451, 877	VCCCCY1HH330J		33pF 50V Ceramic	AA
					C459	VCE9PF1AW106M		10µF 10V Electrolytic, (N.P)	AE
					C464, 865, 874	VCCCCY1HH560J		56pF 50V Ceramic	AA
					C465	VCCCCY1HH271J		270pF 50V Ceramic	AA
					C466, 646, 660, 678, 1411	VCSATA0JJ475M		4.7µF 6.3V Tantalum, (N.P)	AC
					C468, 4414	VCSATE1AJ226M		22µF 10V Tantalum, (N.P)	
					C469	VCE9PE0GW226M		22µF 4.0V Electrolytic, (N.P)	
					C470, 471, 821, 2425	VCCCCY1HH151J		150pF 50V Ceramic	AA
					C479, 2412, 2417	VCSATA1AJ475M		4.7µF 10V Tantalum, (N.P)	AC
					C481, 483, 484, 499, 1401, 1403, 1412	VCKYTV1CF474Z		0.47µF 16V Ceramic	AB
					C482	VCKYTV1CF224Z		0.22µF 16V Ceramic	AB
					C488, 489	VCSATA1AJ335M		3.3µF 10V Tantalum, (N.P)	AC
					C491, 653	VCEAPF1CW106M		10µF 16V Electrolytic	AB
					C601	VCEAPH1HW225M		2.2µF 50V Electrolytic	AB
					C602, 603, 617, 666	VCKYTQ1CF225Z		2.2µF 16V Ceramic	AB
					C618, 626, 667, 866, 2428	VCCCCY1HH220J		22pF 50V Ceramic	AA
					C621, 824	VCKYCY1EB103K		0.01µF 25V Ceramic	AA

★ MARK: SPARE PARTS DELIVERY SECTION

Ref. No.	Part No.	★	Description	Code
C623, 628, 638, 669, 2406, 2408, 4407, 4409	VCSAPD1CJ105M		1.0µF 16V Tantalum, (N.P)	AC
C624, 879	VCCCCY1HH101J		100pF 50V Ceramic	AA
C629	VCKYCY1EF223Z		0.022µF 25V Ceramic	AA
C630	VCEAPF0JW226M		22µF 6.3V Electrolytic	AB
C632	VCKYCY1HB562K		5600pF 50V Ceramic	AA
C639, 640, 647, 648, 672, 673, 679, 680, 860, 867, 883, 886, 887, 894, 2416, 2418, 4411, 4420	VCKYCY1HB102K		1000pF 50V Ceramic	AA
C642, 675, 2409	VCKYCY1HB152K		1500pF 50V Ceramic	AA
C644, 658, 676, 6403, 6404, 6408	VCEAPF0GW476M		47µF 4.0V Electrolytic	AB
C645, 677	VCSAPD1AJ225M		2.2µF 10V Tantalum, (N.P)	AC
C652, 663, 4410	VCKYCY1HB332K		3300pF 50V Ceramic	AA
C690, 691	VCKYCY1HB272K		2700pF 50V Ceramic	AA
C811, 862, 863	VCKYCY1CF334Z		0.33µF 16V Ceramic	AA
C813	VCSATA0GJ106M		10µF 4.0V Tantalum, (N.P)	AC
C814, 817	VCSAPD1AJ105M		1.0µF 10V Tantalum, (N.P)	AD
C815, 892, 1421, 5701	VCKYTV1CF105Z		1.0µF 16V Ceramic	AB
C816	VCKYCY1EF153Z		0.015µF 25V Ceramic	AA
C820	VCSAPD1VJ224M		0.22µF 35V Tantalum, (N.P)	AB
C822, 2403	VCCCCY1HH100D		10pF 50V Ceramic	AA
C826, 833	VCEAPF1CW476M		47µF 16V Electrolytic	AC
C829, 830	VCEAPF1AW336M		33µF 10V Electrolytic	AC
C832,	VCEAPF0JW107M		100µF 6.3V Electrolytic	AC
C1405	VCEAPF0JW107M		100µF 6.3V Electrolytic	AC
C834	VCEAPF1VW106M		10µF 35V Electrolytic	AB
C839	VCEAPT0JN476M		47µF 6.3V Electrolytic	AC
C840, 855, 857	VCEAPF1EW475M		4.7µF 25V Electrolytic	AB
C844	VCSAPD1DJ474M		0.47µF 20V Tantalum, (N.P)	AD
C856	VCEAPT1CN226M		22µF 16V Electrolytic	AC
C868	VCE9PF1CW475M		4.7µF 16V Electrolytic, (N.P)	AC
C871	VCKYCY1HB681K		680pF 50V Ceramic	AA
C873	VCCCCY1HH150J		15pF 50V Ceramic	AA
C878, 2410, 2419	VCCCCY1HH390J		39pF 50V Ceramic	AA
C880, 881, 882	VCCCCY1HH181J		180pF 50V Ceramic	AA
C885	VCKYCY1EF104Z		0.1µF 25V Ceramic	AA
C888	VCCCCY1EH561J		560pF 25V Ceramic	
C1410, 1414, 1415	VCEAPF0GW227M		220µF 4.0V Electrolytic	AB
C4406	VCKYCY1EB223K		0.022µF 25V Ceramic	AA
C4408	VCSAPD1DJ684M		0.68µF 20V Tantalum, (N.P)	AC
C4418	VCCCCY1HH221J		220pF 50V Ceramic	AA
C4419	VCCCCY1HH120J		12pF 50V Ceramic	AA
C5401	VCEAPH1CW106M		10µF 16V Electrolytic	AB
C6415	VCEAPT1CN107M		100µF 16V Electrolytic	AD

RESISTORS

Ref. No.	Part No.	★	Description	Code
R401, 407, 411, 417, 422, 449, 454, 459; 461, 462, 469, 477, 629, 633, 634, 639, 825, 894, 1402, 1404, 1405, 1414, 1415, 1417, 1431, 1443, 1875, 1889, 2426, 2428, 2431,	VRS-CY1JF102J		1.0k 0.063W 5% Metal Oxide	AA

★ MARK: SPARE PARTS DELIVERY SECTION

Ref. No.	Part No.	★	Description	Code
R4400, 4417, 4441, 4459	VRS - CY1JF102J		1.0k 0.063W 5% Metal Oxide	AA
R402, 439, 473, 654, 658, 4424, 4438	VRS - CY1JF182J		1.8k 0.063W 5% Metal Oxide	AA
R403, 426, 451, 464, 465, 472, 496, 655, 657, 1406, 1430, 1432, 1863, 2406, 2417, 2421, 4437, 4439	VRS - CY1JF222J		2.2k 0.063W 5% Metal Oxide	AA
R404, 405, 415, 418, 420, 425, 453, 475, 893, 4406	VRS - CY1JF471J		470 0.063W 5% Metal Oxide	AA
R406, 410, 413, 419, 1868, 4415, 4416	VRS - CY1JF221J		220 0.063W 5% Metal Oxide	AA
R408, 409, 640	VRS - CY1JF181J		180 0.063W 5% Metal Oxide	AA
R412, 1886	VRS - CY1JF151J		150 0.063W 5% Metal Oxide	AA
R414, 642, 644, 651, 806, 809, 857, 890, 1427, 1804, 4422, 4458	VRS - CY1JF333J		33k 0.063W 5% Metal Oxide	AA
R416, 423, 868, 869, 1810,	VRS - CY1JF472J		4.7k 0.063W 5% Metal Oxide	AA
R1811, 2412, 4471	VRS - CY1JF472J		4.7k 0.063W 5% Metal Oxide	AA
R421	VRS - CY1JF680J		68 0.063W 5% Metal Oxide	AA
R424, 471, 474, 1403, 2425	VRS - CY1JF272J		2.7k 0.063W 5% Metal Oxide	AA
R427, 493, 612, 613, 621, 624, 632, 637, 638, 646, 647, 650, 662, 667, 840, 860, 861, 864, 873, 1407, 1408, 1422, 1869, 1888, 1890, 2420, 2432, 2433, 4414, 4420, 4442, 6405, 6406, 6407	VRS - CY1JF103J		10k 0.063W 5% Metal Oxide	AA
R428, 432, 433, 831, 2430, 6410	VRS - CY1JF822J		8.2k 0.063W 5% Metal Oxide	AA
R429, 649, 1801, 4421, 4423	VRS - CY1JF183J		18k 0.063W 5% Metal Oxide	AA
R430, 669, 1802, 1805, 1870, 6421, 6422	VRS - CY1JF563J		56k 0.063W 5% Metal Oxide	AA
R434, 437, 607	VRS - CA1JF103J		10k 0.063W 5% Metal Oxide	AA
R436, 463, 631,	VRS - CY1JF152J		1.5k 0.063W 5% Metal Oxide	AA

★ MARK: SPARE PARTS DELIVERY SECTION

Ref. No.	Part No.	★	Description	Code
R653, 659, 2423, 2429	VRS - CY1JF152J		1.5k 0.063W 5% Metal Oxide	AA
R443, 466, 818, 823, 872, 874	VRS - CY1JF105J		1.0 0.063W 5% Metal Oxide	AA
R445, 677, 847, 851, 891, 2405, 2410, 2414, 4455, 4456, 4473, 4478	VRS - CY1JF000J		00 0.063W 5% Metal Oxide	AA
R448, 470	VRS - CY1JF823J		82k 0.063W 5% Metal Oxide	AA
R450, 6408	VRS - CY1JF184J		180k 0.063W 5% Metal Oxide	AA
R452, 836, 854, 1426	VRS - CY1JF101J		100 0.063W 5% Metal Oxide	AA
R455, 460, 499, 623, 663, 848, 862, 866, 1428, 4425, 4452, 4485	VRS - CY1JF223J		22k 0.063W 5% Metal Oxide	AA
R456, 1409, 4484	VRS - CY1JF391J		390 0.063W 5% Metal Oxide	AA
R458, 4413, 4481	VRS - CY1JF681J		680 0.063W 5% Metal Oxide	AA
R476	VRS - CY1JF224J		220k 0.063W 5% Metal Oxide	AA
R478	VRS - CY1JF274J		270k 0.063W 5% Metal Oxide	AA
R494, 670, 671, 2434, 2435	VRS - CY1JF682J		6.8k 0.063W 5% Metal Oxide	AA
R497, 630, 897, 1429, 4409, 4482	VRS - CY1JF331J		330 0.063W 5% Metal Oxide	AA
R498, 622, 883, 4457	VRS - CY1JF273J		27k 0.063W 5% Metal Oxide	AA
R602	VRS - CA1JF561J		560 0.063W 5% Metal Oxide	
R603	VRS - CA1JF224J		220k 0.063W 5% Metal Oxide	
R608, 609, 610, 611	VRS - CY1JF474J		470k 0.063W 5% Metal Oxide	AA
R614	VRS - CA1JF563J		56k 0.063W 5% Metal Oxide	
R615	VRS - CA1JF104J		100k 0.063W 5% Metal Oxide	AA
R616	VRS - CA1JF273J		27k 0.063W 5% Metal Oxide	
R635, 660, 813, 867, 885, 1418, 2422	VRS - CY1JF473J		47k 0.063W 5% Metal Oxide	AA
R636, 4462, 4479	VRS - CY1JF153J		15k 0.063W 5% Metal Oxide	AA
R641, 880, 1401, 1410, 4465	VRS - CY1JF821J		820 0.063W 5% Metal Oxide	AA
R643, 665, 674, 832, 886, 889, 4443, 4470	VRS - CY1JF562J		5.6k 0.063W 5% Metal Oxide	AA
R645, 656, 668, 865, 870, 871, 2403	VRS - CY1JF683J		68k 0.063W 5% Metal Oxide	AA
R648, 661, 807, 810, 1808, 4450, 6409	VRS - CY1JF154J		150k 0.063W 5% Metal Oxide	AA
R652, 875, 876, 1419, 2401, 4440	VRS - CY1JF104J		100k 0.063W 5% Metal Oxide	AA
R664	VRS - CA1JF333J		33k 0.063W 5% Metal Oxide	
R672, 1423	VRS - CA1JF682J		6.8k 0.063W 5% Metal Oxide	AA
R675, 676	VRS - CY1JF394J		390k 0.063W 5% Metal Oxide	AA
R800, 801, 803, 812, 814,	VRS - CY1JF393J		39k 0.063W 5% Metal Oxide	AA

★ MARK: SPARE PARTS DELIVERY SECTION

Ref. No.	Part No.	★	Description	Code
R830, 833, 884, 1800, 2436	VRS-CY1JF393J		39k 0.063W 5% Metal Oxide	AA
R802, 808, 811, 828, 1803	VRS-CY1JF303J		30k 0.063W 5% Metal Oxide	AA
R804	VRS-CY1JF163F		16k 0.063W 1% Metal Oxide	AA
R805	VRS-CY1JF153F		15k 0.063W 1% Metal Oxide	AA
R820	VRS-CY1JF272F		2.7k 0.063W 1% Metal Oxide	AA
R821	VRS-CY1JF334J		330k 0.063W 5% Metal Oxide	AA
R822	VRS-CY1JF684J		680k 0.063W 5% Metal Oxide	AA
R824, 4407, 4483	VRS-CY1JF271J		270 0.063W 5% Metal Oxide	AA
R835	VRS-CY1JF363J		36k 0.063W 5% Metal Oxide	AA
R837	VRS-CA1JF101J		100 0.063W 5% Metal Oxide	AA
R839, 841, 842, 843, 844, 892, 898, 1885, 2407, 2411, 2415, 2471	VRS-CY1JF561J		560 0.063W 5% Metal Oxide	AA
R845	VRS-CA1JF393J		39k 0.063W 5% Metal Oxide	
R850	VRS-CY1JF106J		10 0.063W 5% Metal Oxide	AA
R853, 4435	VRS-CY1JF471F		470 0.063W 1% Metal Oxide	AA
R858	VRS-CA1JF823J		82k 0.063W 5% Metal Oxide	AA
R863, 4486, 6415	VRS-CY1JF392J		3.9k 0.063W 5% Metal Oxide	AA
R877	VRS-CY1JF223F		22k 0.063W 1% Metal Oxide	AA
R878	VRS-CY1JF123F		12k 0.063W 1% Metal Oxide	AA
R879	VRS-CY1JF333F		33k 0.063W 1% Metal Oxide	AA
R881	VRS-CA1JF564J		560k 0.063W 5% Metal Oxide	
R887, 888	VRS-CY1JF100J		10 0.063W 5% Metal Oxide	AA
R899	VRS-CY1JF470J		47 0.063W 5% Metal Oxide	AA
R1411, 1412, 1413, 1416, 1420	VRS-CY1JF390J		39 0.063W 5% Metal Oxide	AA
R1421	VRS-CY1JF330J		33 0.063W 5% Metal Oxide	AA
R1425	VRS-CY1JF750J		75 0.063W 5% Metal Oxide	AA
R1883	VRS-TV1JD563J		56k 0.063W 5% Metal Oxide	AA
R2402, 2413, 4418, 4461, 4463, 4487, 4491	VRS-CY1JF332J		3.3k 0.063W 5% Metal Oxide	AA
R2418	VRS-CY1JF121J		120 0.063W 5% Metal Oxide	AA
R2419	VRS-CY1JF913F		91k 0.063W 1% Metal Oxide	
R2427, 4480	VRS-CY1JF122J		1.2k 0.063W 5% Metal Oxide	AA
R4404	VRS-CY1JF820J		82 0.063W 5% Metal Oxide	AA
R4426	VRS-CY1JF681F		680 0.063W 1% Metal Oxide	AA
R4427	VRS-CY1JF472F		4.7k 0.063W 1% Metal Oxide	AA
R4428, 4460	VRS-CY1JF332F		3.3k 0.063W 1% Metal Oxide	AA
R4430	VRS-CY1JF391F		390 0.063W 1% Metal Oxide	AA
R4431, 4433	VRS-CA1JF473J		47k 0.063W 5% Metal Oxide	AA
R4451	VRS-CA1JF102J		1.0k 0.063W 5% Metal Oxide	AA
R4466	VRS-CA1JF223J		22k 0.063W 5% Metal Oxide	AA
R4468	VRS-CY1JF122F		1.2k 0.063W 1% Metal Oxide	AA
R4469	VRS-CY1JF183F		18k 0.063W 1% Metal Oxide	AA
R4489	VRS-CY1JF225J		2.2 0.063W 5% Metal Oxide	AA
R6401, 6402	VRS-TV1JD330J		33 0.063W 5% Metal Oxide	AA
R6403, 6404	VRS-CY1JF123J		12k 0.063W 5% Metal Oxide	AA
R6414	VRS-CA1JF683J		68k 0.063W 5% Metal Oxide	AA
R6419	VRS-CY1JF433J		43k 0.063W 5% Metal Oxide	AA
R6420	VRS-CY1JF243J		24k 0.063W 5% Metal Oxide	AA

MISCELLANEOUS PARTS

FB1401	RBLN-0035TAZZ		Balun	
P44	QPLGN0363TAZZ		Plug	AC
P45	QPLGN0263TAZZ		Plug	AB
RMC570	RRMCU0007TAZZ		Remote Receiver	
SC41	QSOCN0067FJZZ		Socket	AF
SC46	QSOCN1848TAZZ		Socket	AE
SC47	QSOCN0647TAZZ		Socket	AE
S5703, 5704, 5705	QSW-K0088GEZZ		Switch	AD
S5706,	QSW-K0087GEZZ		Switch	AC

★ MARK: SPARE PARTS DELIVERY SECTION

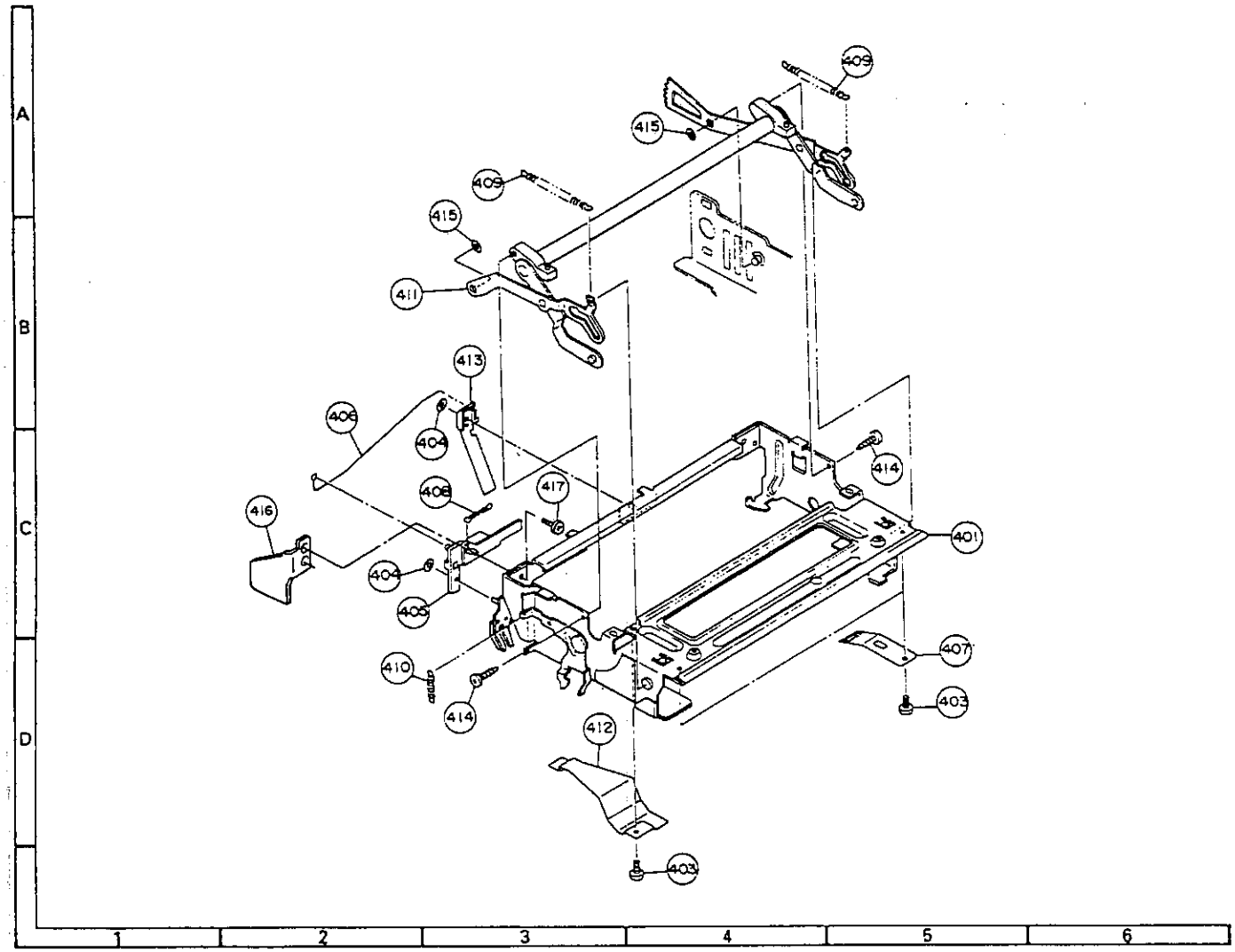
Ref. No.	Part No.	★	Description	Code
S5707, 5708, 5710, 5711, 5712, 5713	QSW-K0087GEZZ		Switch	AC
	OTHERS PARTS			
	SPAKC6329TAZZ		Packing Case (VL-H400S)	
	SPAKC6363TAZZ		Packing Case (VL-H400H)	
	SPAKC6364TAZZ		Packing Case (VL-H400X)	
	SPAKC6365TAZZ		Packing Case (VL-H9E)	
	SPAKP6049TAZZ		Wrapping Paper	AC
	SSAKA0002CEZZ		Polyethylene Bag	AA
	TCADN0069TAZZ		Card (VL-H400S/H)	
	TCADN0070TAZZ		Card (VL-H400X)	
	TINSL0031TAZZ		Instruction Book (VL-H400S)	
	TINSE0150TAZZ		Instruction Book (VL-H400H)	
	TINSE0151TAZZ		Instruction Book (VL-H400X)	
	TINSE0152TAZZ		Instruction Book (VL-H9E)	
	RRMCG0020TASA		Infrared R/C (VL-H400S/H/X)	
	RRMCG0023TASA		Infrared R/C (VL-H9E)	
	QCNW-1140TAOO		DC Cable	AU
	QCNW-1169TAZZ		AV Cable	AN
	VSP0028P-31WN		Speaker	
	PNNOK0003TAZZ		Cleaning Cloth	AF
	RMICC0055TASA		Microphone	

Ref. No.	Part No.	★	Description	Code

CASSETTE COMPARTMENT ASS'Y PARTS LIST

★ MARK: SPARE PARTS DELIVERY SECTION

Ref. No.	Part No.	★	Description	Code	Ref. No.	Part No.	★	Description	Code
	CHLDX3067GE01		Cassette Compartment Ass'y		408	MSPRT0354GEFJ		Tape Protector Spring	AA
					409	MSPRT0355GEFJ		Up Spring	AA
401	LHLDX3067GEZZ		Cassette Housing Ass'y		410	MSPRT0357GEFJ		Lock Spring	AA
403	LX-HZ3069GEFN		Screw, M1.4×1.6Ni		411	NSFTD0028GEZZ		Main Shaft Ass'y	AN
404	LX-WZ1063GE00		Cut Washer, 1.2-4-0.5	AA	412	PGIDH0040GEFW		Cassette Cover Guide	AB
405	MARMP0051GEZZ		Protector Arm	AA	413	PSHEP0005GEZZ		Tape Protector Ass'y	AD
406	MLNKM0013GEFJ		Protector Rod	AA	414	LX-HZ3065GEFF		B Tight, M1.7×5	AA
407	MSPRP0147GEFJ		Depressing Spring	AC	415	LX-WZ1056GE00		Cut Washer, 1.6-4.0-0.25	AA



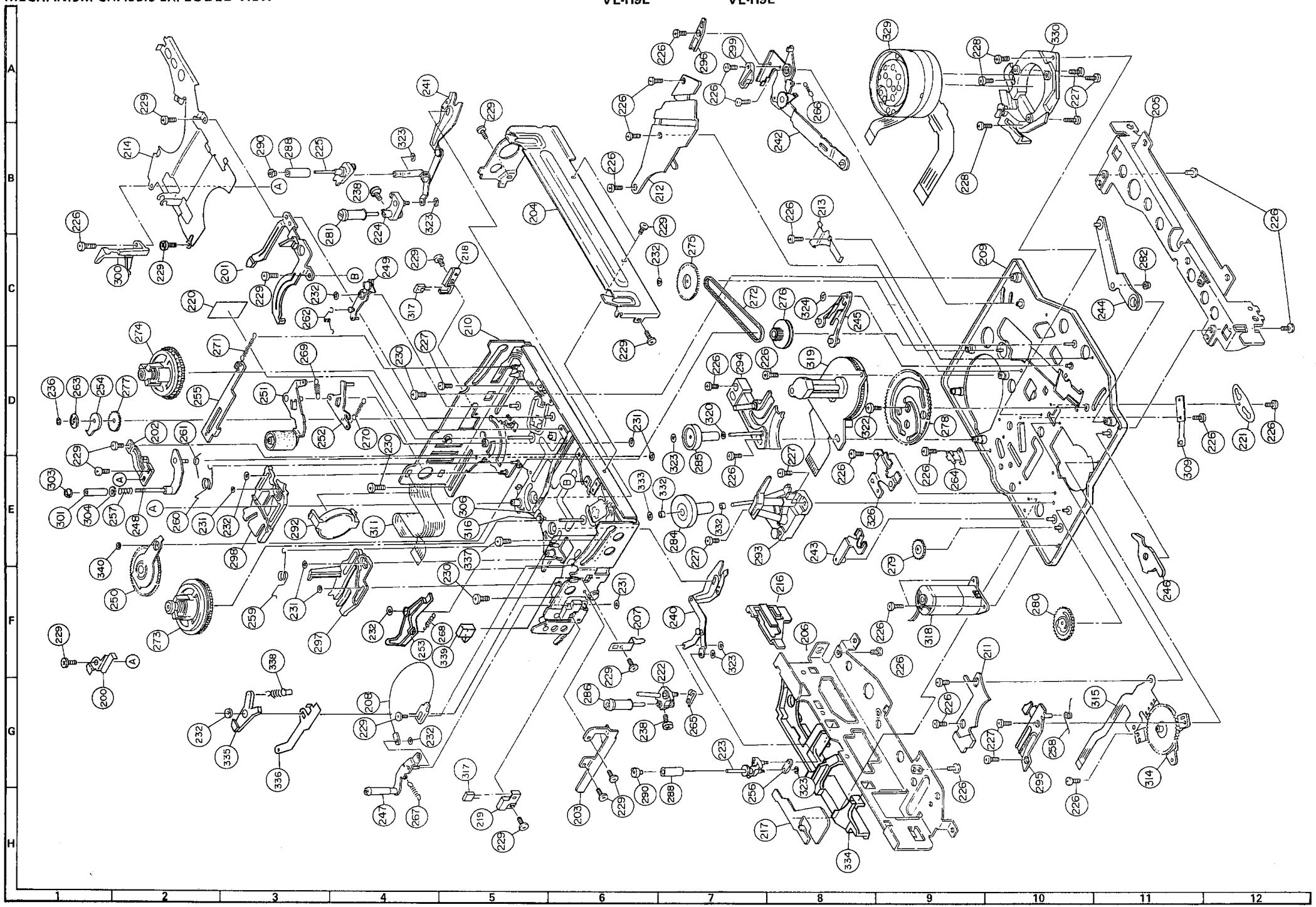
MECHANISM CHASSIS PARTS LIST

★ MARK: SPARE PARTS DELIVERY SECTION

Ref. No.	Part No.	★	Description	Code
200	LANGA0065GFFW		Reel Stoper	
201	LANGF9525GEZZ		Reel Lock Release Angle Ass'y	AE
202	LANGG9086GEFW		Slide Adjusting Angle	AC
203	LANGG9087GEFW		SL Guide Angle	AC
204	LANGG9088GEFT		Down Guide	AG
205	LANGJ0026GEFW		HL Mechanism Frame F	AF
206	LANGJ0027GEFW		HL Mechanism Frame R	AF
207	LANGQ9050GEFW		Down SW Retaining Angle	AA
208	LBNDK3019GEZZ		Tension Wire Ass'y	AF
209	LCHSM0126GEZZ		Main Chassis Ass'y	AV
210	CCHSS0033GE00		Slide Chassis Ass'y	BF
211	LDAiS1001GEZZ		S Loading Arm Support	AB
212	LDAiS1002GEZZ		T Loading Arm Support	AB
213	LDAiS3001GEFW		SL Chassis Drive Lever Support	AB
214	LHLDP3001GEFW		LED Holding Angle	AE
216	LHLDW1128GEZZ		Relay FPC Retainer	AB
217	LHLDW1129GEZZ		FPC Holder	AB
218	LHLDZ1811GEZZ		Start Sensor Holder	AC
219	LHLDZ1812GEZZ		End Sensor Holder	AC
220	LHLDZ1846GENZ		FPC Cover	AB
221	LHLDZ3043GEFW		Pressure Lever Holder	AB
222	LPOLM0041GEZZ		Pole Base S1 Ass'y	AM
223	LPOLM0042GEZZ		Pole Base S2 Ass'y	AL
224	LPOLM0043GEZZ		Pole Base T1 Ass'y	AL
225	LPOLM0044GEZZ		Pole Base T2 Ass'y	AM
226	LX-BZ3128GEFF		Screw, M1.4×L2, D2.5	AA
227	LX-BZ3129GEFF		Screw, M1.4×L3, D2.5	AA
228	LX-BZ3130GEFF		Screw, M1.4×L4, D2.5	AA
229	LX-BZ3131GEFN		Screw, M1.4×L1.6, D3.0	AA
230	LX-BZ3132GEFF		Screw, M1.4×L1.5, D3.5	AA
231	LX-WZ1052GE00		Cut Washer, φ0.7-φ1.8-t0.2	AA
232	LX-WZ1053GE00		Cut Washer, φ0.7-φ2.5-t0.2	AA
236	LX-WZ1066GE00		Cut Washer, φ0.7-φ2.2-t0.13	AA
238	LX-XZ3034GEZZ		Worm Screw, M1.2×1.5	AB
240	MARMM0096GEZZ		S Loading Arm Ass'y	AK
241	MARMM0100GEZZ		T Loading Arm Ass'y	AK
242	MLEVF0363GEZZ		Pinch Drive Lever Ass'y	AN
243	MLEVF0364GEZZ		T Arm Operating Lever Ass'y	AE
244	MLEVF0365GEZZ		SL Chassis Drive Lever Ass'y	AF
245	MLEVF0366GEZZ		Loading Pressure Lever Ass'y	AF
246	MLEVF0367GEZZ		Eject Lever Ass'y	AD
247	MLEVF0368GEZZ		Tension Arm Ass'y	AN
248	MLEVF0369GEZZ		Tu Guide Arm Ass'y	AG
249	MLEVF0370GEZZ		Tu Rachet Ass'y	AH
250	MLEVF0375GEZZ		Swing Arm Ass'y	AH
251	MLEVF0376GEZZ		Pinch Roller Lever Ass'y	AQ
252	MLEVF0377GEZZ		Pinch Double Acting Lever Ass'y	AD
253	MLEVP0226GEZZ		Main Brake	AB
254	MLEVP0222GEZZ		Lock Brake Lever	AA
255	MSLiF0065GEFW		Tu Holding Guide Operating Plate	AB
256	MSLiF0066GEZZ		PBS2 Slider	AA
257	MSPRC0181GEFJ		Tu Guide Adjusting Spring	AA
258	MSPRD0134GEFJ		Eject Lever Spring	AA
259	MSPRD0135GEFJ		Slide Rail L Spring	AB
260	MSPRD0136GEFJ		Slide Rail R Spring	AA
261	MSPRD0137GEFJ		Tu Guide Arm Spring	AA
262	MSPRD0138GEFJ		Tu Rachet Spring	AA
263	MSPRP0144GEFJ		Lock Brake Spring	AA
264	MSPRP0145GEFJ		PBT1 Holding Spring	AB
265	MSPRP0146GEFJ		PBS1 Slider	AA
266	MSPRT0348GEFJ		EOT Release Lever Spring	AA
267	MSPRT0349GEFJ		T Arm Spring	AA
268	MSPRT0362GEFJ		Main Brake Spring	AA
269	MSPRT0351GEFJ		Pinch Pressure Spring	AA
270	MSPRT0352GEFJ		Pinch Release Spring	AB
271	MSPRT0353GEFJ		Tu Guide Operating Lever Spring	AB
272	NBLTT0006GEZZ		Timing Belt	AE
273	NDAiV1057GEZZ		S Reel Disk Ass'y	AN
274	NDAiV1058GEZZ		Tu Reel Disk Ass'y	AM
275	NGERH1188GEZZ		Relay Gear Ass'y	AD
276	NGERH1189GEZZ		Drive Gear Ass'y	AD
277	NGERH1190GEZZ		Lock Brake Gear	AB
278	NGERH3037GEZZ		Main Cam	AC
279	NGERH3038GEZZ		Loading Gear Ass'y	AF
280	NGERH3040GEZZ		T Cam	AD
281	NROLM0024GEZZ		Guide Roller T1 Ass'y	AQ
282	NROLM0025GEZZ		Cam Roller	AD
284	NROLM0030GEZZ		Si Roller -H Ass'y	AW
285	NROLP0100GEZZ		TS Roller Ass'y	AC
286	NROLP0097GEZZ		Guide Roller S1 -H Ass'y	AH
288	NROLP0092GEZZ		Guide Roller T2	AF
290	PCAPS1020GEZZ		GRT2 Cap	AB
292	PDMP-0007GEZZ		Damper	AH
293	PGiDM0111GEZZ		S Stopper -H Ass'y	AW
294	PGiDM0099GEZZ		Tu Stopper Ass'y	AQ
295	PGiDM0114GEZZ		T Arm Rail L	AB
296	PGiDM0102GEZZ		P Guide Rail	AB
297	PGiDM0103GEZZ		Slide Rail L	AC
298	PGiDM0104GEZZ		Slide Rail R	AC
299	PGiDM0106GEZZ		EOT Operating Lever Guide	AB
300	PGiDM0107GEZZ		PB Protector	AB
301	PGiDP0026GEFW		Tu Guide	AD

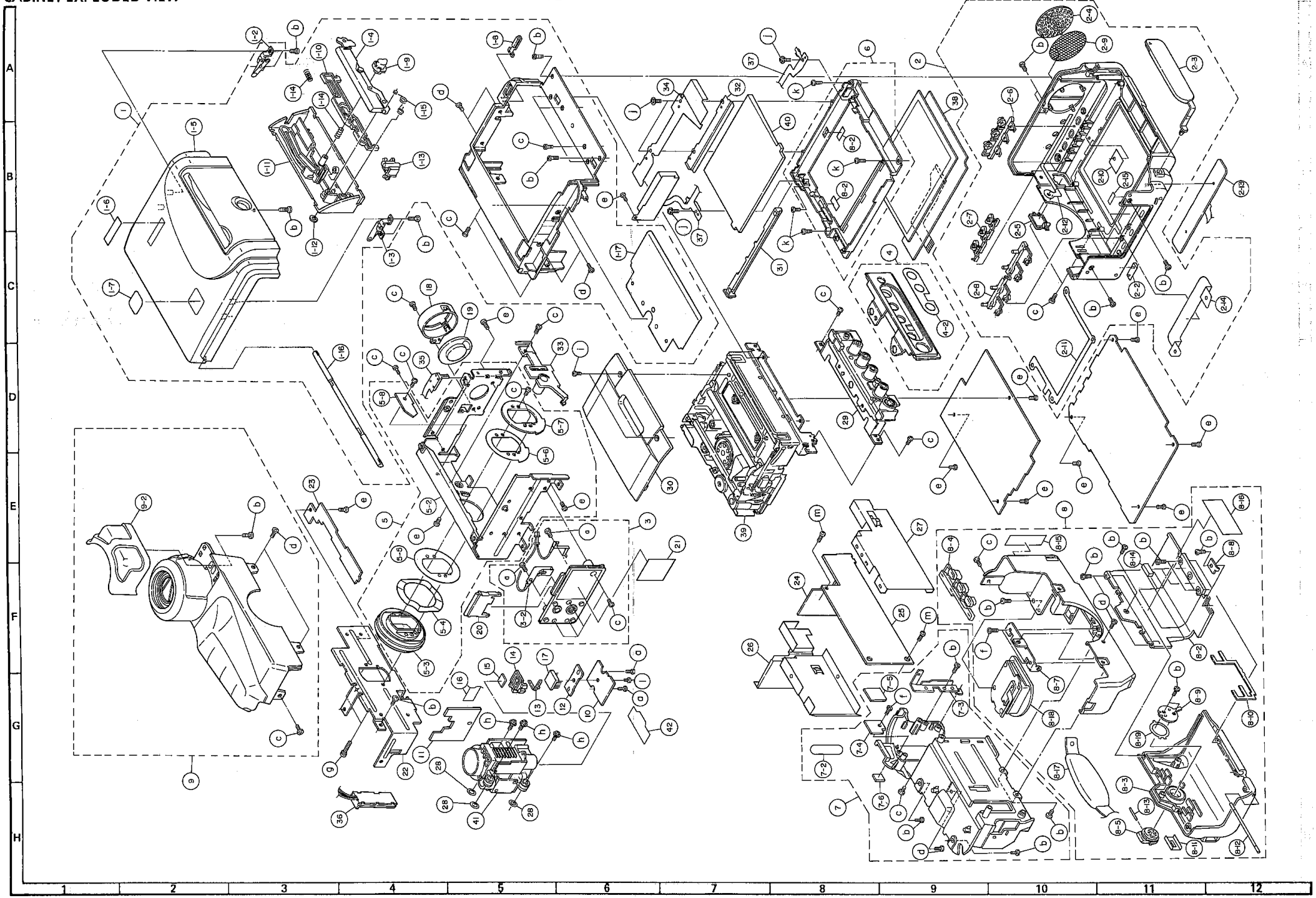
★MARK: SPARE PARTS DELIVERY SECTION

Ref. No.	Part No.	★	Description	Code
303	PGiDS0039GEFW		Tu Guide Upper Flange	AD
304	PGiDS0040GEFW		Tu Guide Lower Flange	AA
306	PSPAZ0316GEZZ		LED Spacer	AB
309	QBRSK0027GEZZ		Earth Brush Ass'y	AC
311	QPWBH4016GEZZ		Relay FPC-L	AH
314	QSW-R0031GEZZ		Mode SW	AL
315	RDTCH0031GEZZ		DEW Sensor Ass'y	AN
316	RH-PX0064TAZZ		Cassette LED	AD
317	RH-PX0065TAZZ		S/E Sensor	AC
318	RMOTM1059GEZZ		Loading Motor Ass'y	AW
319	RMOTN2046GEZZ		Capstan Motor	BB
320	XWHJZ12-02025		Washer, φ1.2-φ2.5-t0.25	AA
322	LX-BZ3136GEFD		Screw, 2 Kinds, M1.4-L2.5	AA
323	LX-WZ1064GE00		Cut Washer, φ0.8-φ2.5-t0.2	AA
324	LX-WZ1029GE00		Cut Washer, φ1.2-φ3-t0.25	AA
326	LHLDZ3042GEFW		T Cam Holder	AB
329	DDRMW0030GE05		Drum Ass'y	CC
330	PGiDC0047GEZZ		Drum Base Ass'y	AR
332	PSPAX0012GEZZ		Si Roller Spacer	AA
333	LX-WZ1060GE00		Cut Washer, φ1.2-φ2.5-t0.25	AA
334	PGIDM0113GEZZ		Tape Guide	AD
335	MLEVP0225GEZZ		L Brake	AA
336	MLEVF0381GEFW		L Brake Operating Lever	AB
337	LX-BZ3138GEFF		Special Screw, M1.4×L1.5, D3.5	AB
338	MSPRT0361GEFJ		L Brake Spring	AA
339	QSW-M0033GEZZ		Cassette Control Down SW	AC
340	LX-WZ1071GE00		Cut Washer, φ0.7-φ1.8-t0.1	AA



VL-H400S/H/X
VL-H9E

CABINET EXPLODED VIEW



CABINET PARTS LIST

★MARK: SPARE PARTS DELIVERY SECTION

Ref. No.	Part No.	★	Description	Code
1	CCABA6104TA01		Cabinet V Ass'y (VL-H400S/H/X)	BD
1	CCABA6104TA03		Cabinet V Ass'y (VL-H9E)	
1-2	CANGK0297TA01		Positioning Stay Ass'y (Upper)	AK
1-3	CANGK0297TA02		Positioning Stay Ass'y (Lower)	AK
1-4	CLEGM0019TA01		Stand Ass'y	AN
1-5	GFTAC1115TASA		VCR Lid (VL-H400S/H/X)	AS
1-5	GFTAC1120TASA		VCR Lid (VL-H9E)	
1-6	HBDGB0035TASA		Badge "SHARP"	
1-7	HBDGS0054TASA		Badge LCD	AE
1-8	JBTN-0215TASB		EJECT Button	AE
1-9	JBTN-0218TASA		VCR Lid Open Button	AE
1-10	LHLDZ1220TAZZ		VCR Lid Lock Holder	AC
1-11	LHLDZ1221TAZZ		Stand Holder	AF
1-12	LX-WZ1006GE00		Cut Washer	AA
1-13	MLEVP0010TAZZ		VCR Lid Lock Lever	AC
1-14	MSPRC0059TAFJ		VCR Lid Lock Spring	
1-15	MSPRD0022TAFJ		Stand Support Spring	AB
1-16	NSFTZ0019TAZZ		Axle Damper	AK
1-17	PCOVP9035TA00		Cassette Control Lid Cover	AC
2	CCABB6104TA01		Cabinet L Ass'y (VL-H400S/H)	BA
2	CCABB6107TA01		Cabinet L Ass'y (VL-H400X/H9E)	BA
2-2	GCOVA1302TASA		Remote Control Receptor Cover	AB
2-3	GCOVA1304TASA		AV Terminal Cap	
2-4	GCOVA1306TAKA		Speaker Cover	AE
2-5	GFTAS1002TASA		BL Lid	AC
2-6	JBTN-0219TASA		Operation Button A	AC
2-7	JBTN-0220TASA		Operation Button B	AE
2-8	JBTN-0221TASA		Operation Button C	AE
2-9	PCOVP9038TAZZ		Speaker Net	
2-10	PZETV0283TAZZ		Light Guide Plate (Upper)	AB
2-11	QEARP0141TAZZ		LCD Earth Plate	AD
2-12	QEARP0156TAZZ		Inverter Earth Plate	
2-13	QSW-Z0077TAZZ		VCR Operation Switch	AR
2-14	PZETV0290TAZZ		Light Guide Plate	
2-15	PZETV0289TAZZ		Light Guide Plate (Bottom)	
3	CDAI-1041TAK1		Tripod Ass'y	AL
3-2	QCNW-1187TAZZ		Lithium Terminal Unit	AG
4	CCASP0053TA01		AV Terminal Case Ass'y	AM
4-2	HINDP0171TASA		AV Terminal Nameplate	
5	CANGF0279TA01		MH Frame Ass'y	AY
5-2	LANGF0279TAFW		MH Frame	AQ
5-3	GDAI-3046TAFW		Rotation Section Spacer	AN
5-4	MSPRP0100TAFW		Rotation Section plate Spring	AC
5-5	PSPAZ0064TAZZ		Rotation Section Sheet A	AC
5-6	PSPAZ0065TAZZ		Rotation Section Sheet B	AD
5-7	LANGH0050TAFW		Positioning Plate	AC
5-8	QSW-Z0052TAZZ		Rotation Detection Switch	AM
6	CHLDZ1187TA01		L Holder Ass'y	AK
6-2	TLABZ0306TAZZ		Shielding Label	AB
7	DCABC6029TA01		Camera Cabinet C Ass'y	AW
7-2	HBDGP0057TASA		Camera Name Plate	
7-3	LANGK0291TAFW		Camera Fitting	AB
7-5	PMLT-0094TAZZ		Camera Specer A	
7-6	PMLT-0095TAZZ		Camera Specer B	
8	DCABE6029TA01		Camera Cabinet E Ass'y	BB
8-2	GCOVA1303TASA		Battery Rear Cover	AF
8-3	GFTAB1035TASA		Battery Cover	AN
8-4	JBTN-0222TASA		Camera Operation Button A	AE
8-5	JKNBP0093TASA		Battery Cover Lock Knob A	AE
8-6	JKNBP0094TASA		Battery Cover Lock Knob B	AE
8-7	LANGK0293TAFW		Battery Hinge Fitting	AC
8-8	LANGK0294TAFW		Battery Shaft Fitting	AA
8-9	LANGK0295TAFW		Battery Shaft Crossarm Fitting	
8-10	LANGK0296TAFW		Battery Lock Fitting	
8-11	NSPRP0112TAFW		Battery Knob Spring	AA
8-12	NSFTZ0020TAFW		Battery Hinge Shaft	AC
8-13	MSFTZ0021TAFW		Battery Lock Shaft	AA
8-14	PSPAZ0077TAZZ		Battery Crossarm Spacer	
8-15	TLABH0168TAZZ		Inversion caution Label	AA
8-16	TLABH0176TAZZ		Battery Label	AB
8-17	UBNDT0069TASA		Hand Strap	
8-19	MSPRP0113TAFW		Battery Lock Spring	
9	CCABD6029TAK1		Camera Cabinet D Ass'y	BA
9-2	RMICC0055TASA		Microphone	BA
10	DUNTK2435QA00		CCD P.W.B	-
11	DUNTK2438QA00		Lens P.W.B	-
12	LANGK0280TAFW		CCD Retaining Sheet	AD
13	LHLDZ1173TA00		CCD Positioning Holder	AB
14	PCOVM8014TA00		CCD Dust Protection Rubber	AC
15	PFILW0058TAZZ		Crystal	AW
16	QCNW-1260TAZZ		Lens~Camera P.W.B FPC	AF
17	VHILZ236351-1		CCD Sensor	BR
18	LHLDZ1186TAZZ		Speaker Holder	AC
19	VSP0028P-32WN		Speaker	
20	LHLDB1015TASA		Lithium Lid	AC
21	TLABM1484TAZZ		Model Label (VL-H400S)	AB
21	TLABM1489TAZZ		Model Label (VL-H400H)	
21	TLABM1490TAZZ		Model Label (VL-H400X)	AB
21	TLABM1491TAZZ		Model Label (VL-H9E)	
22	LANGF0288TAFW		Rotating Frame	AG
23	QSW-Z0079TAZZ		Camera Switch Unit	AQ

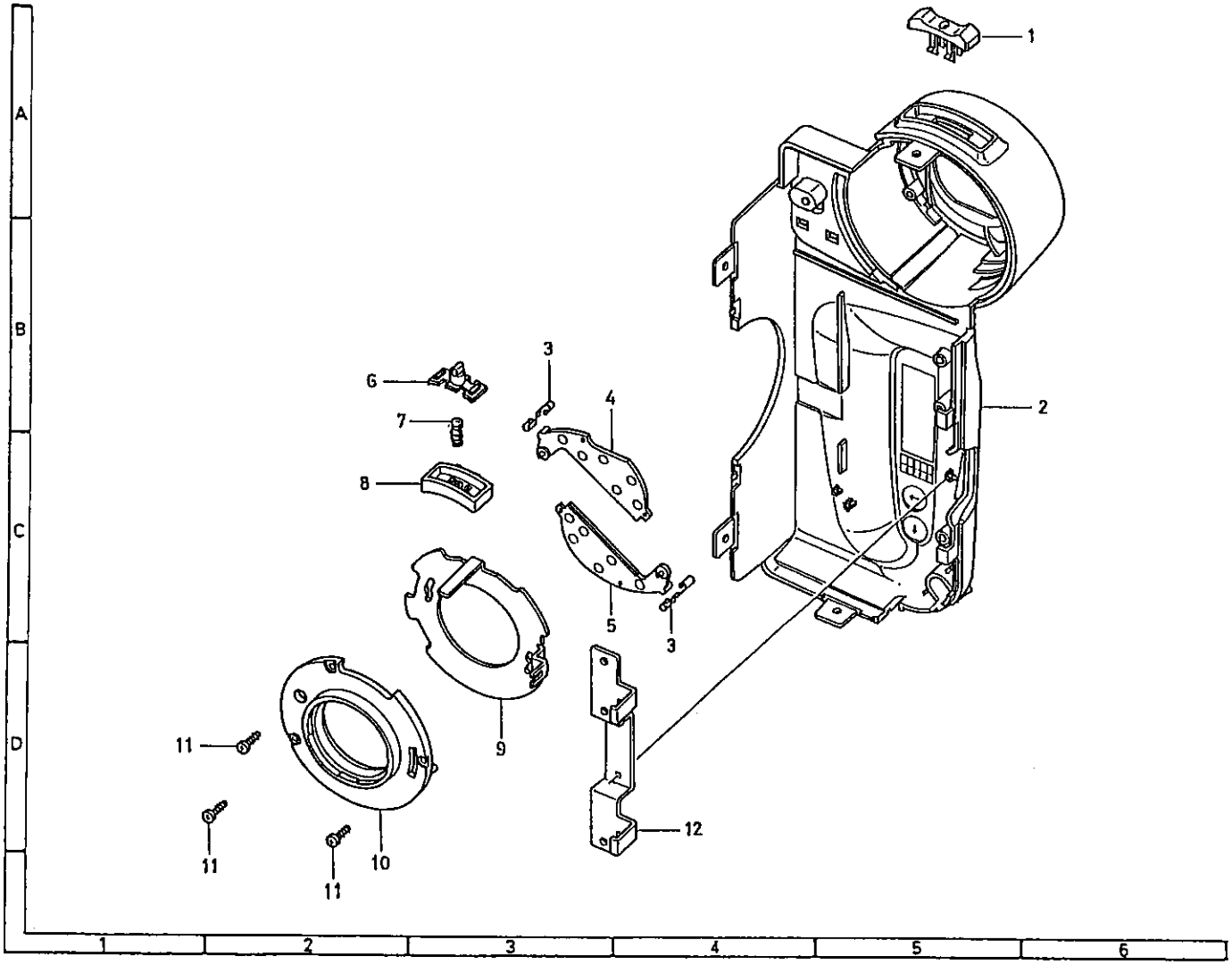
★ MARK: SPARE PARTS DELIVERY SECTION

Ref. No.	Part No.	★	Description	Code
24	DUNTK2436QA00		Camera Sub P.W.B	-
25	DUNTK2437QA00		Camera Main P.W.B	-
26	PSLDM3154TAFW		Camera Shild Case A	AN
27	PSLDM3155TAFW		Camera Shild Case B	AF
28	PSPAZ0071TA00		Lens Spacer	AA
29	QTANJ0034TAZZ		AV Terminal	AV
30	GFTAC1025GESB		Cassete Compartment Cover	AF
31	CLMPV0006TA01		Fluorescent Tube Unit	AZ
32	LANGG0039TAFW		LCD Holder Guide	AC
33	LHLDW1027TAZZ		FPC Holder	AC
34	PZETV0288TAZZ		Insulator Sheet A	
35	QSW-Z0051TAZZ		EJECT Switch Unit	AL
36	QTANZ0053TAZZ		Battery Terminal	AK
37	RUNTK0291TAZZ		Inverter Unit	BC
38	CPNLC0359RM01		LCD Panel Unit	CF
39	DSETU0288KE00		VCR P.W.B Unit	-
40	CGIDM0010TA01		Light Guide Plate Unit	AZ
41	CLNSA0119TA01		Lens Unit	BV
42	QPWBH2440TAZZ		CCD FPC	-
44	QSW-Z0080TAZZ		Electric Source Switch Unit	AP
45	QSW-Z0081TAZZ		Zoom SW Unit	AS
a	XEBSD20P06000		Screw (M2-6)	AA
b	LX-HZ0018TAFF		Screw (M2-6)	AA
c	XIPSF20P04000		Screw (M2-4)	AA
d	XIPSF20P03000		Screw (M2-3)	AA
e	XIPSD20P03000		Screw (M2-3)	AA
f	LX-HZ0030TAFF		Screw (M2-4)	AA
g	XBPSD26P12J00		Screw (M2.6-12)	AA
h	LX-HZ3037GEFD		Screw (M2-6)	AA
i	LX-BZ0175TAFF		Screw (M1.7-5)	AA
j	LX-HZ3025CEFF		Screw (M1.7-5)	AA
k	XJPSD20P06000		Screw (M2-6)	AA
l	LX-BZ0176TAFF		CCD Fixing Screw	AA
	XEBSD20P05000		Screw (M2-5) Tapping	AA
	LX-WZ1006GE00		Cut Washer (Stand)	AA

FRONT PANEL UNIT PARTS LIST

★ MARK: SPARE PARTS DELIVERY SECTION

Ref. No.	Part No.	★	Description	Code	Ref. No.	Part No.	★	Description	Code
	CCABD6029TAK1		Front cover ass'y		7	99JXSHC516338		Knob spring	AB
	CCABD6029TAK1		Front panel ass'y		8	99JXSHC516337		Knob holder	AC
1	99JXSHC516335		Knob	AC	9	99JXSHC516333		Operation ring	AG
2	99JXSHC516332		Front Panel	AW	10	99JXSHC516334		Ring holder	AD
3	99JXSH515848		Feather SP	AC	11	99JBTP174025		Cross screw (Ni)	AA
4	99JXSH515842		Shutter feather (1)	AE	12	99JXSHC516330		Lock metal	AF
5	99JXSH515843		Shutter feather (2)	AE	13	99JXSHC516340		Aluminum sheet (1)	AD
6	99JXSHC516336		Lock button	AC	14	99JXSHC516341		Aluminum sheet (2)	AD

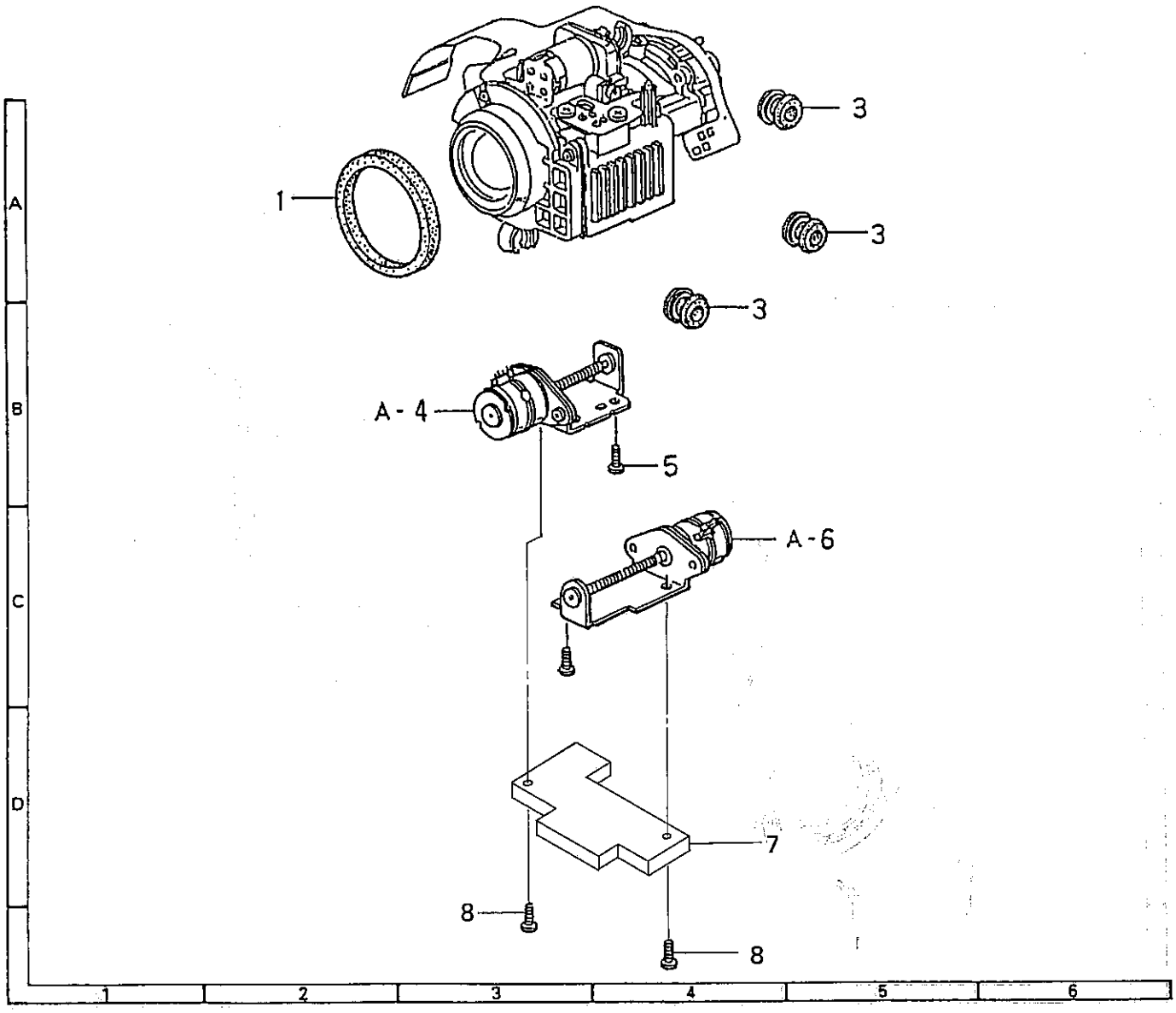


LENS UNIT PARTS LIST

★MARK: SPARE PARTS DELIVERY SECTION

Ref. No.	Part No.	★	Description	Code
	99JCLNSA0119TA01		Lens Unit	BV
1	9 9 J X S H 5 1 5 8 2 5		Front Group Rubber	AC
3	9 9 J X S H 5 1 5 8 1 5		Anti-Vibration Rubber	AC
A-4	9 9 J X S H 5 1 5 8 1 8		F Motor Ass'y	AY

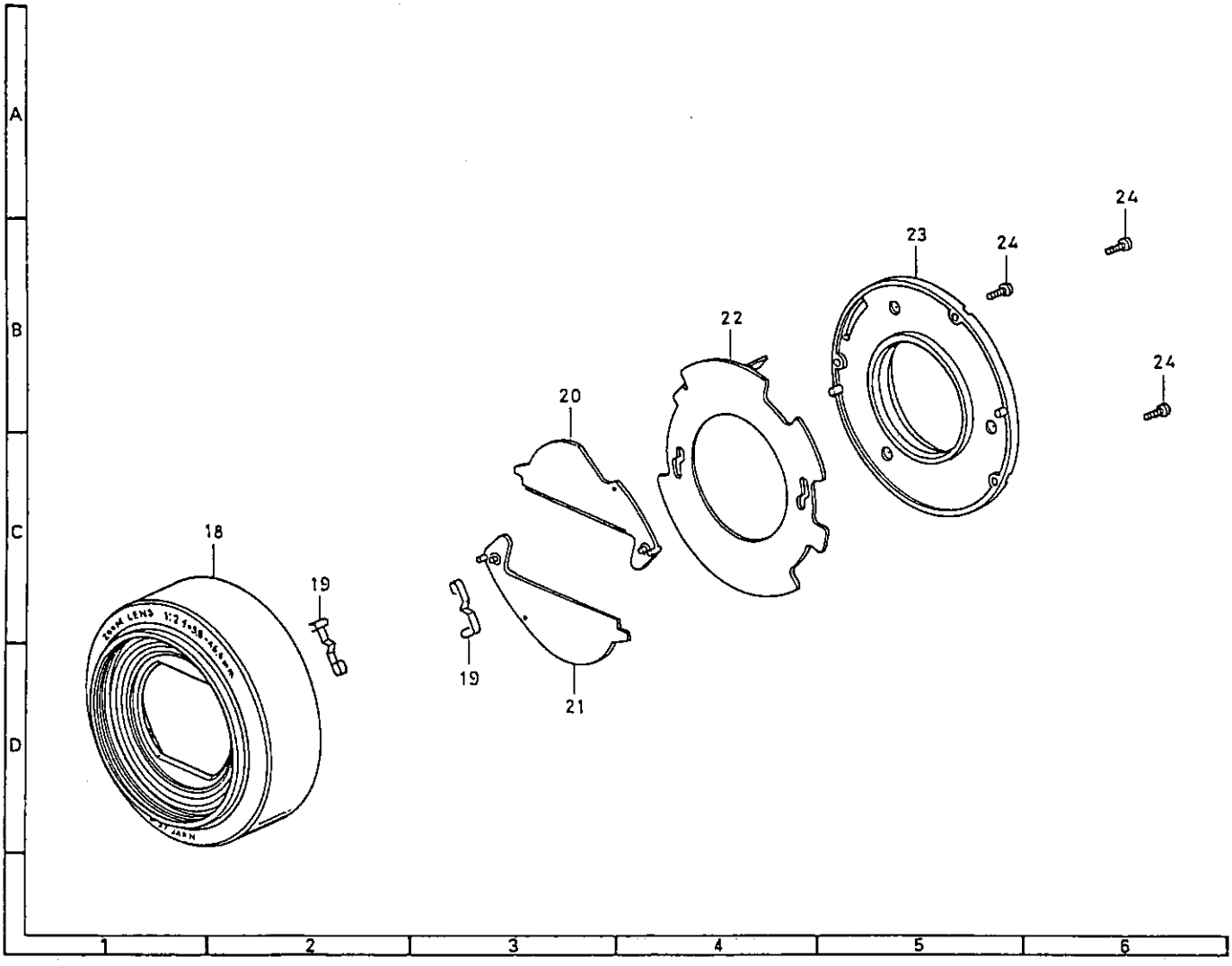
Ref. No.	Part No.	★	Description	Code
5	9 9 J B T P 1 7 3 5 2 5		Screw (B)	AA
A-6	9 9 J X S H C 5 1 6 3 0 6		Z Motor Ass'y	AY
7	9 9 J X S H C 5 1 6 3 1 3		Anti-Vibration Sheet	AG
8	9 9 J B T P 1 7 6 5 3 0		Screw (B)	AA



SHUTTER UNIT PARTS LIST

★ MARK: SPARE PARTS DELIVERY SECTION

Ref. No.	Part No.	★	Description	Code	Ref. No.	Part No.	★	Description	Code
	CCOVA1270TA01		Shutter Unit	AU	21	99JXSH515843		Shutter Leaf (2)	AE
18	99JXSH515841		Cover	AG	22	99JXSH515844		Control Ring	AF
19	99JXSH515846		Leaf Spring	AC	23	99JXSH515845		Ring Retainer	AD
20	99JXSH515842		Shutter Leaf (1)	AE	24	99JBTP174025		Screw	AA



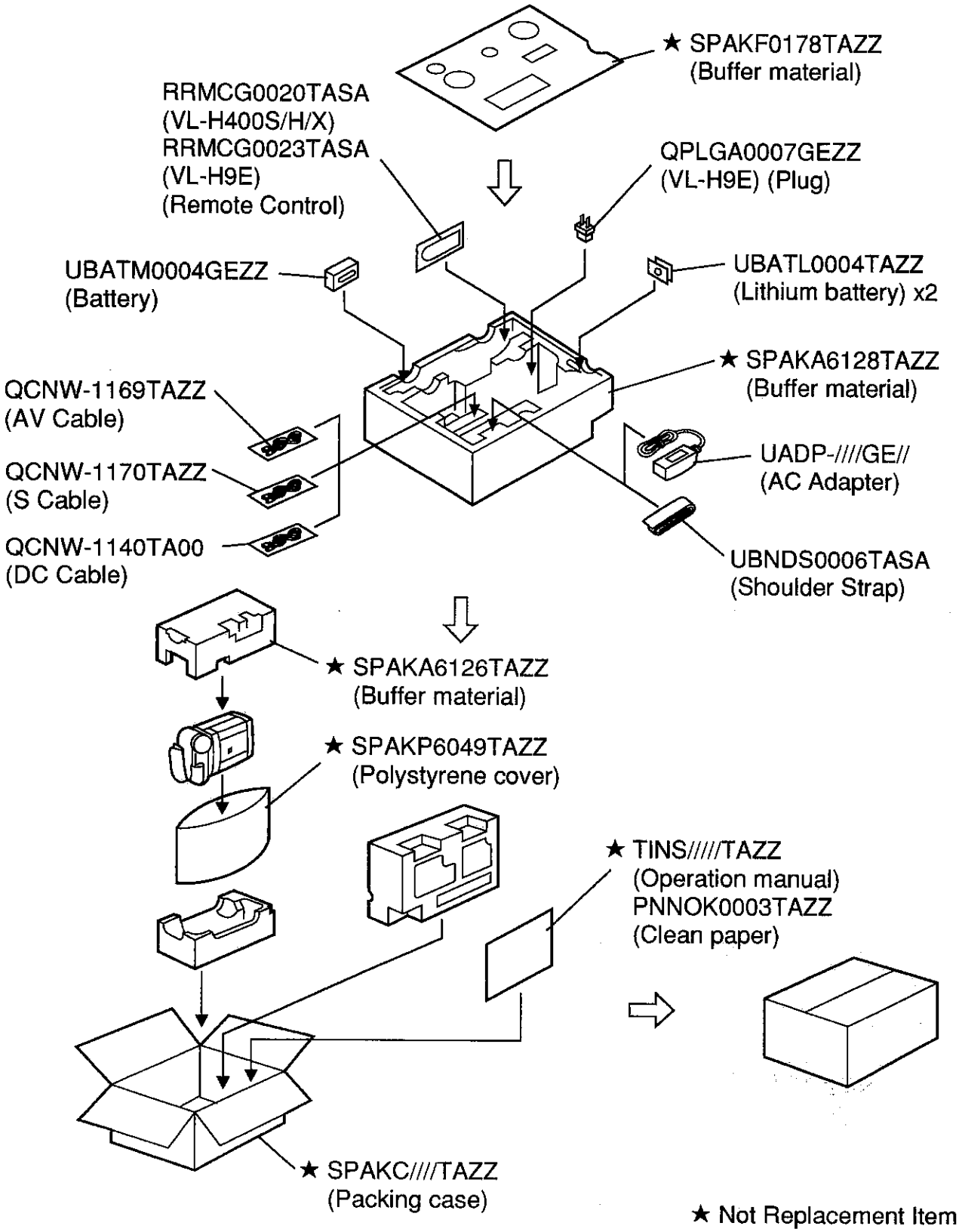
14. PACKING OF THE SET

● SETTING POSITIONS OF SWITCH

Power Switch	at "OFF" Position

● ACCESSORY PART CORD LIST BY MODELS

Model	AC Adapter	Operation Manual	Paking Case
VL-H400U	UADP-0156GEZZ	TINSE0153TAZZ	SPACKC6358TAZZ
VL-H400U	UADP-0165GEZZ	TINSE0372TAZZ	SPACKC6668TAZZ



★ Not Replacement Item

15. AC ADAPTER

UNIT No. UADP-0158GEZZ (VL-H400S)
UADP-0159GEZZ (VL-H400H)
UADP-0157GEZZ (VL-H400X)
UADP-0160GEZZ (VL-H9E)

Features

- Compact and light-weight design for easier portability.
- Automatic voltage change AC 110V to AC 240V allows the adapter usage even in your trips abroad.
- Charging function with battery pack.
- Rapid charging function to enable the charging in a shorter period of time.

Specifications

Power Requirement:	AC 110-240V, 50/60Hz
DC Output:	DC 6.0V
Power Consumption:	23W
Dimensions (approx.):	70 (W) × 44 (H) × 164 (D) mm
Weight (approx.):	390g (VL-H400S/X/H9E) 460g (VL-H400H)

* Specifications are subject to change without notice.

15-1. PROCEDURES ON SERVICING

• Disassembly

1. Remove the two screws Ⓑ from the bottom of the case Ⓐ.
2. Remove the top case Ⓒ.
3. Take out the shield plates Ⓓ and Ⓔ.
4. Remove the three supporters Ⓗ to take out the heat sinks Ⓕ and Ⓖ.
5. Remove the three supporters Ⓘ to take out the terminal box Ⓘ.

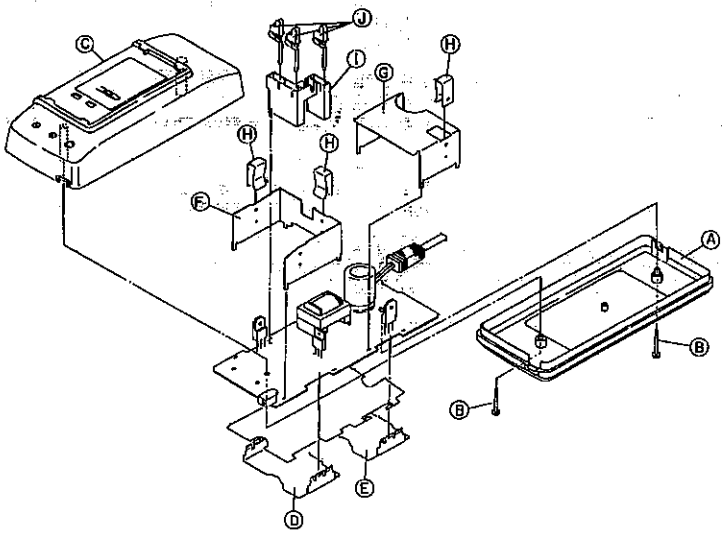


Figure 15-1.

15-2. OPERATION MANUAL

15-2-1. Outline

The AC adapter is designed to be used as the power supply for the camcorder as well as to rapidly recharge its battery.

This unit consists of a separately excited switching regulator which employs control IC and a multi-functional circuit in the secondary side as shown by the block diagram in Fig. 15-2-1.

The primary control circuitry and the secondary multi-functional circuitry, composed mainly of surface mounted components, are housed in a small portable casing to cope with various user applications.

The multi-input type adapter accepts the input voltages of 110-240V at 50/60Hz. This handy unit can therefore be carried around and used all over the world.

The basic operation is controlled by two sections. In the power switching section, constant-voltage and constant-current controls are performed by comparing with the reference voltage at the secondary side. The battery charging section, on the other hand, is provided with timers, various detection circuits and sequence controller. As an AC adapter, the unit feeds the EIAJ-rated constant-voltage DC power through its DC jack, and as a battery charger, the unit starts the rapid charging operation when the dedicated Ni-Cd battery is placed in position with the DC plug unconnected.

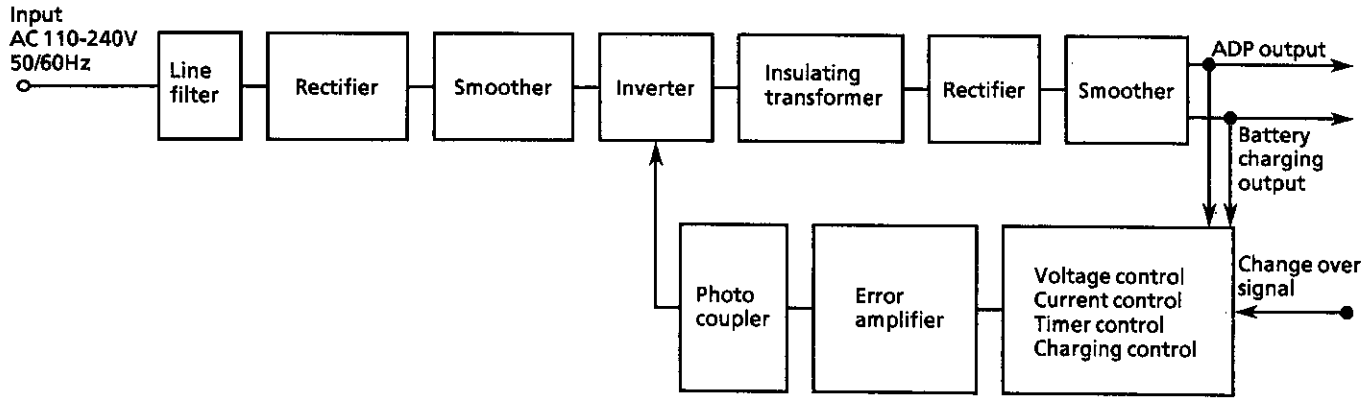


Figure 15-2-1. Block diagram (Camcorder adapter)

15-2-2. Operation

1. Adapter mode

When the DC plug is attached to the adapter, the constant DC voltage (6.8V, 2.0A) can be obtained via the DC jack to operate the camcorder.

The power consumption can be kept constant over the entire control input range, i.e. regardless of input fluctuations.

The output is available up to 1.5 times the rated current, such as a transient starting current and rush current which would flow in the camcorder.

Also, the adapter output overcurrent protector with fold back current, which controls the power when the short circuit from the outside occurs, is used to prevent the adapter from being destroyed or broken down. It also prevents the temperature inside the adapter from rising too excessively.

2. Ni-Cd charge mode

This adapter, when Ni-Cd battery is attached, can be used as a quick charger. This charging operation is divided into operationing modes of three stages. The adapter goes through these modes sequentially.

Fig.15-2-2 shows the charging characteristics in these three stages.

The first stage is called initial charging. A constant current of 1.2A is charged with a limited voltage of 9.5V for 5 minutes, set by the timer, from point A.

The voltage is thus limited in order to protect the battery against overvoltage and overcharging which would otherwise occur on a fully-charged battery.

The time limit serves to prevent charging error which would take place on a dead battery due to an initial voltage drop.

The second stage is a quick charging mode. Like in the initial charging, a rapid 1.2A charging is made with a limited voltage of 9.5V, but for the timer-controlled charging time of 180 minutes.

Toward the end of this mode, a battery voltage drop ($-\triangle V$ phenomenon at point B) is detected to tell the end of the quick charging, to stop the charging and to go to the next stage.

In this quick 1.2A charging, the 1100mAh battery and the 2400mAh battery are fully charged in about 65 minutes and about 140 minutes, respectively. The timer is set to 180 minutes by which an overcharging possibly due to $-\triangle V$ detection error can be avoided.

The $-\triangle V$ detection level is 80-120mV, in which range noise-caused detection errors are kept off.

In the third stage called trickle charging, auxiliary charging is carried on between points C and D. By so doing, the battery can be fully charged.

The trickle charging is generally set at 1/20-1/30C depending on a battery's characteristics. This adapter adopts a charging system that is controlled by a constant voltage and fixed resistance.

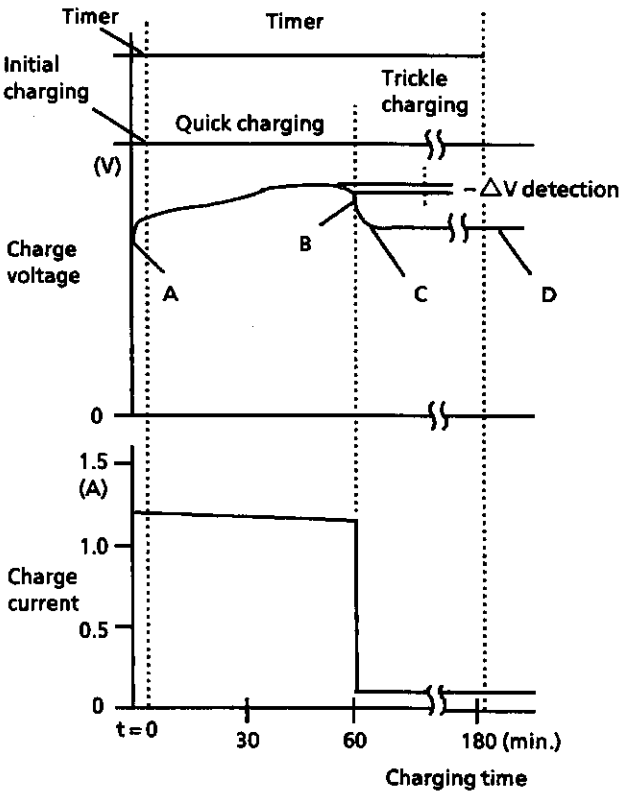


Figure 15-2-2. Charging characteristics with 1100mAh battery

3. Refresh mode

This adapter is prone to a drop in charging efficiency due to their peculiar memory effect. To avoid the drop, this battery may be forcedly discharged using the user switch. Now the battery is ready to get charged anew in the above-mentioned steps.

Push the refresh switch with the battery in place, and a discharge current of 0.3-0.7A flows out and the power is consumed by the resistor inside the adapter.

To minimize its degrading, the battery is discharged down to 5.0V or so, not further down. Then the battery goes into the charging mode.

15-2-3. Circuits

The circuits used for the adapter are explained according to the circuit diagram in page 16-7.

1. Input section
   The input section consists of noise filter and rectification smoothing circuit of condenser input. The noise filter, which consists of L1, C1, C26, C27 and C28, reduces common mode noise.
   R61 is a resistance for discharging electricity retained at input AC plug when the power is turned off.
   The amount of rush current which is caused when the power is turned on is greatly limited by R2, DC resistance of L1 and the operating resistance of D1.

2. Switching section
   The switching circuit, corresponding to the signals sent from the IC for controlling the primary side, makes FET Q1 work as a drive as a switch by using the DC voltage rectified through C2. It, together with the transformer T1, makes up a high-frequency inverter.
   R3 and C3 are surge absorber circuits which absorb the surge voltage generated from the switching of Q1.

3. Primary side control section
   This section drives the switching section by converting the pulse duration of the signal received from the secondary side control circuit through the photo coupler.
   The control IC (IC4) is used to drive Q1 (MOS FET). This IC, operating as an overvoltage protector, contains a circuit which stops oscillating when it detects the overvoltage at D20.

4. Output circuit section
   The secondary side output, which can be controlled by a popular on-off system, reduces output ripples and common mode noise through the choking coils of L2 and L4.
   Q7 is a transistor for the quick / trickle charging selector switch. When Q7 is on, constant-current quick charging is made, and when off, the trickle current flows through R40 and R41.
   D10 is used to prevent discharging trouble to the control circuit section caused when the input is turned off with the battery attached.

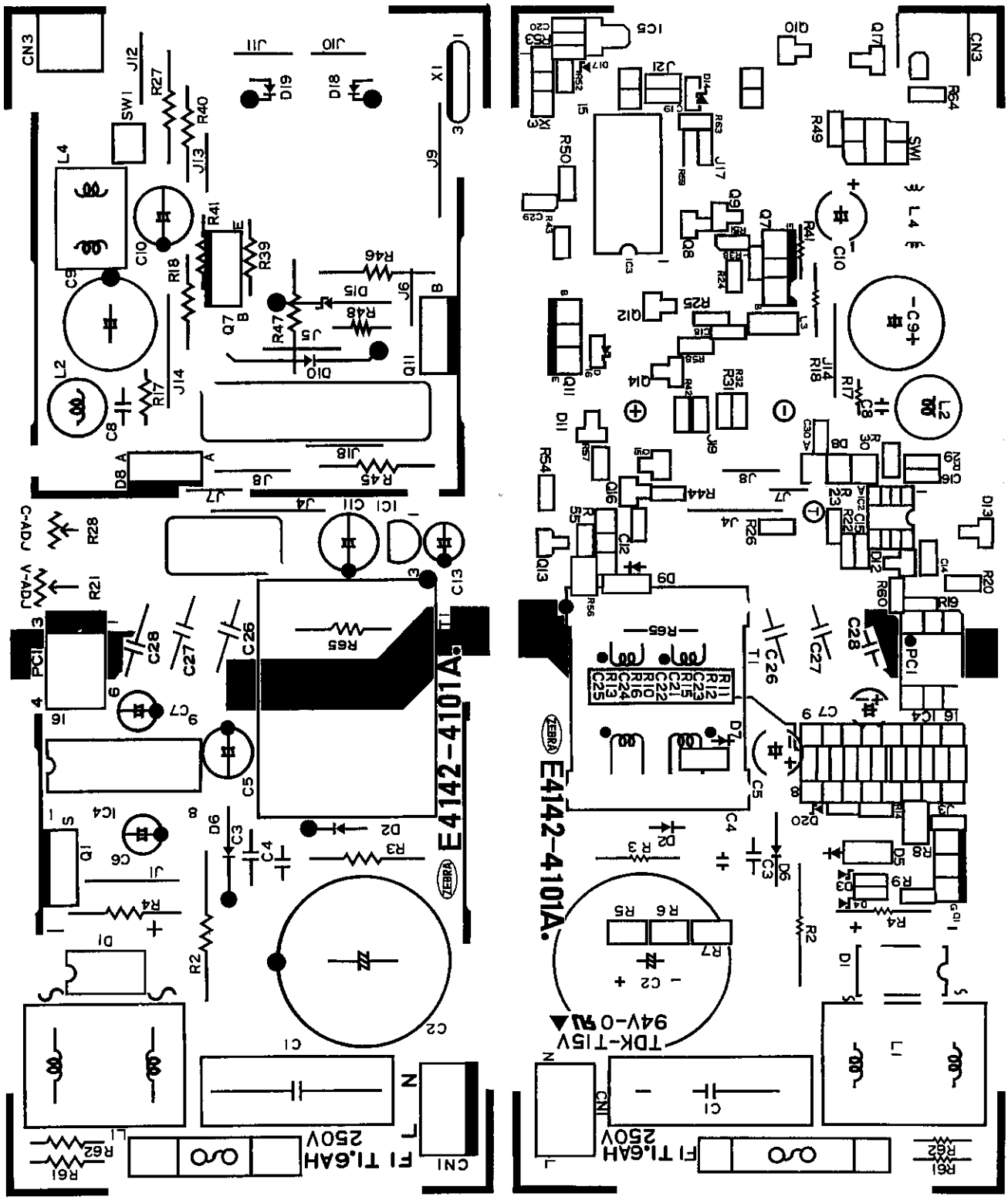
5. Battery detection circuit
   The transistor switch in Q7 is kept off without the battery in position. Once the battery has been placed, the impedance of the battery makes current flow out of D11, which turns on Q13 and Q14 to let pin 10 of IC3 detect that the battery is in position and also turns on the transistor switch to let the charging operation start.

6. Secondary side control section
   The function of the secondary control section is to control the switching section by detecting the output voltage and current and conducting the detected signals to the primary side control circuit through the photo coupler.
   The constant voltage is preset and detected with IC2-II, whereas the adapter (6.8 V)/ charge (10.5 V) mode selection is made by setting pin 5 of IC3 to "H" or "L" to change the reference voltage. The constant current and over-current protector are preset and detected with IC2-I, while 1.2 A/0.4 A constant current selection is made with the seventh output of IC3. The over-current protection in the adapter mode is performed by the primary control circuitry.
   IC1 is used to give the drive power for IC3 and a reference voltage for IC2. Fed into IC2 are the signal of a divided reference voltage as well as that of a divided output voltage and current for comparison.

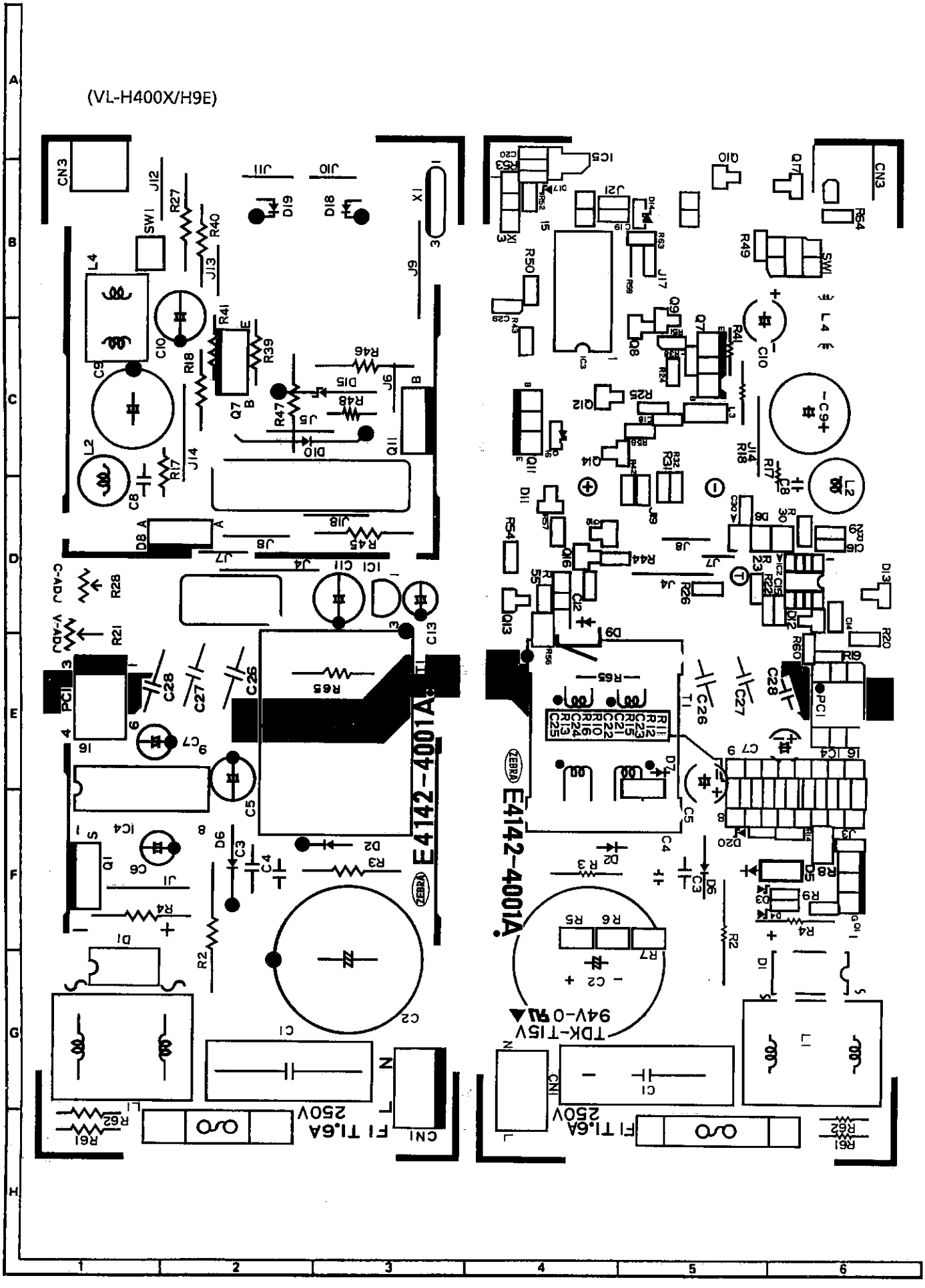
7. Display
   Only LED (D18) lights up in ADP mode.
   In CHG mode, D18 and D19 light up during rapid charging. When rapid charging is completed (trickle mode), only D19 goes out.
   In refresh mode, D18 stays lit with D19 flashing. The instant the discharging has been completed, the rapid charging starts and D19 stops flashing to stay lit.

15-3. AC ADAPTER P.W.B.

(VL-H400S/H)



(VL-H400X/H9E)


E4142-4001A
E4142-4001A
TDK-T15V
94V-0
250V
T1.6A
CN1
CN3
SW1
L1
L2
L4
IC1
IC3
IC4
IC5
Q7
Q8
Q9
Q10
Q11
Q12
Q13
D1
D2
D3
D4
D5
D6
D7
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D9
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C1
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C28
R1
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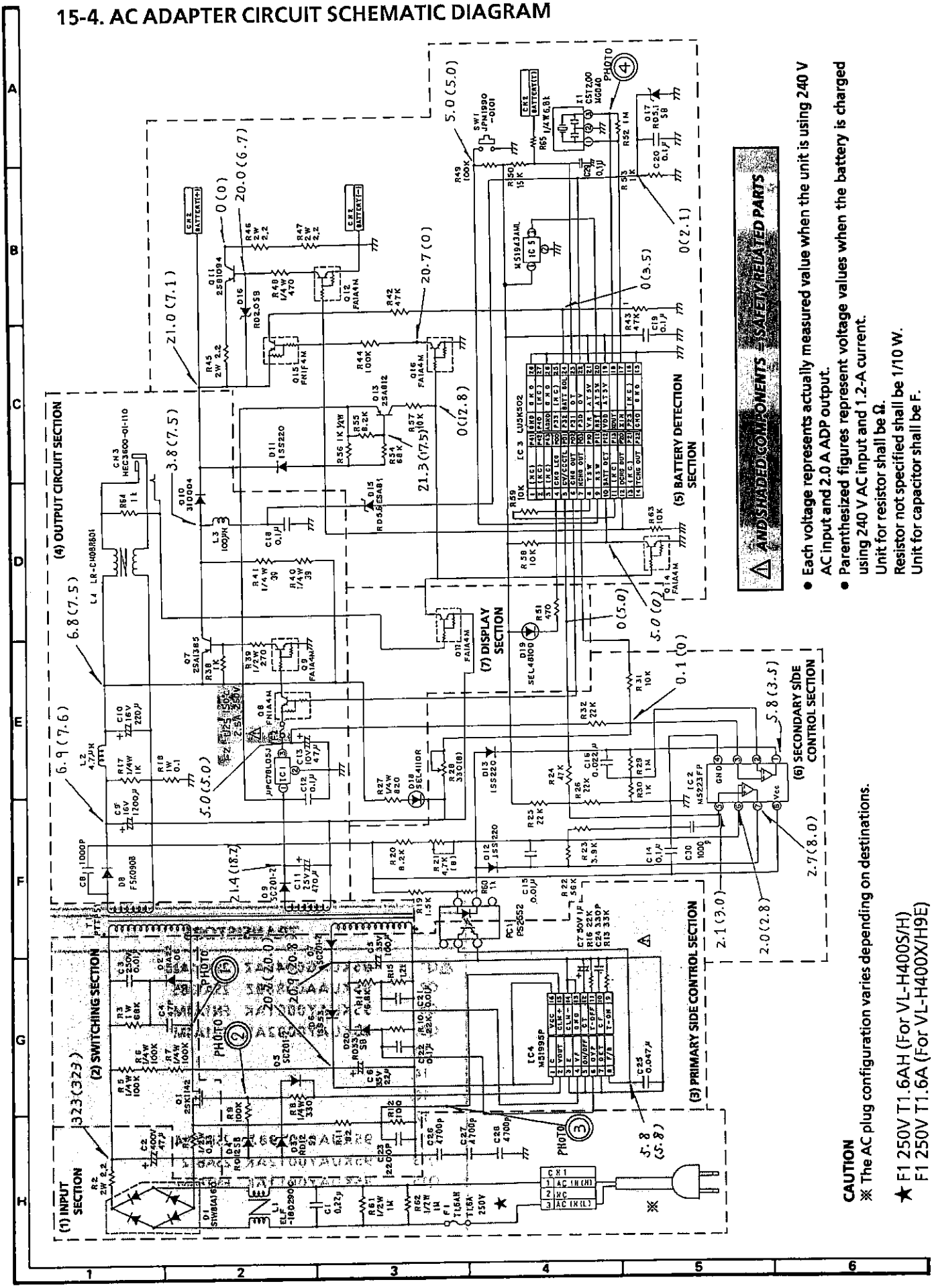
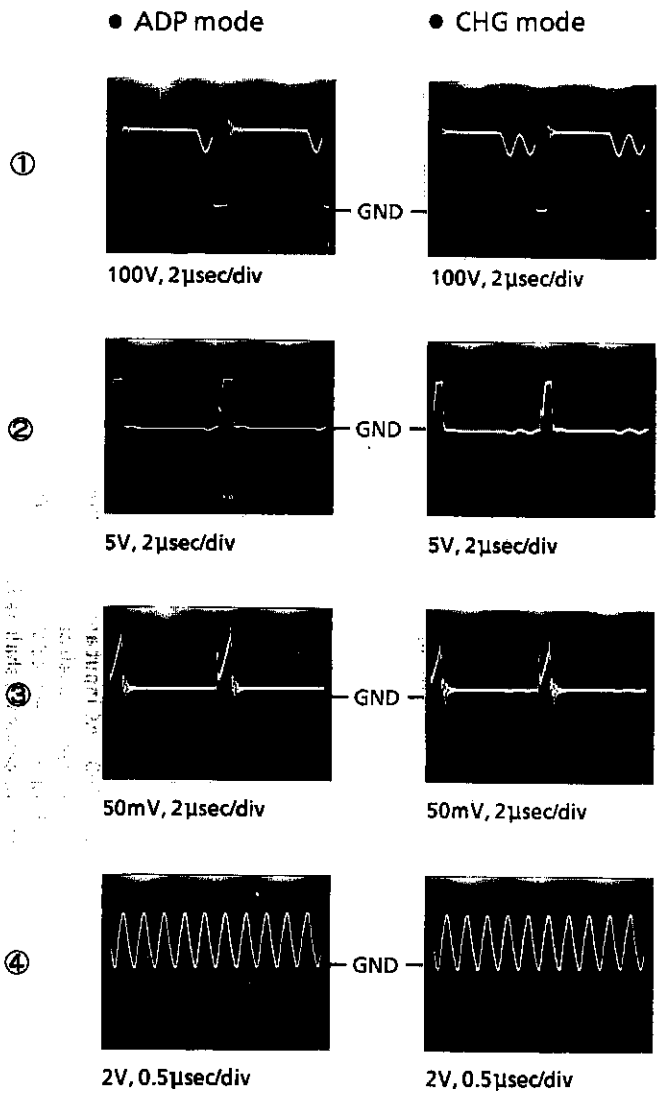
J11
J12
J13
J14
J15
J16
J17
J18
J21
PC1
ZEBRA

15-4. AC ADAPTER CIRCUIT SCHEMATIC DIAGRAM


(1) INPUT SECTION
(2) SWITCHING SECTION
(3) PRIMARY SIDE CONTROL SECTION
(4) OUTPUT CIRCUIT SECTION
(5) BATTERY DETECTION SECTION
(6) SECONDARY SIDE CONTROL SECTION
(7) DISPLAY SECTION
SAFETY-RELATED PARTS
CAUTION
※ The AC plug configuration varies depending on destinations.
★ F1 250V T1.6AH (For VL-H400S/H)
F1 250V T1.6A (For VL-H400X/H9E)
● Each voltage represents actually measured value when the unit is using 240 V AC input and 2.0 A ADP output.
● Parenthesized figures represent voltage values when the battery is charged using 240 V AC input and 1.2-A current.
Unit for resistor shall be Ω.
Resistor not specified shall be 1/10 W.
Unit for capacitor shall be F.



15-5. REPLACEMENT PARTS LIST/ EXPLODED VIEWS

PARTS REPLACEMENT

Many electrical and mechanical parts in camcorder have special safety-related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in this manual; electrical components having such features are identified by ⚠ and shaded areas in the Replacement Parts Lists and Schematic Diagrams. The use of a substitute replacement part which does not have the same safety characteristics as the factory recommended replacement parts shown in this service manual may create shock, fire or other hazards.

"HOW TO ORDER REPLACEMENT PARTS"

To have your order filled promptly and correctly, please furnish the following informations.

1. MODEL NUMBER **2. REF. NO.**
3. PART NO. **4. DESCRIPTION**
5. PRICE CODE

⚠ MARK: SAFETY RELATED PARTS

PWB ASSEMBLY IS NOT REPLACEMENT ITEM

Ref. No.	Part No.	Description	Code

INTEGRATED CIRCUITS

IC1	95KUCB0068AK	UPC78L05J	AF
IC2	95KUCY0011AK	M5223FP	AE
IC3	95KUCY0012AK	LU5K502	AQ
⚠IC4	95KUCC0044AZ	M51995P	AP
IC5	95KUCY0013AK	M51943AML	AF

TRANSISTORS

⚠Q1	95KUAG0048AZ	2SK1142	AM
Q7	95KUAA0086BZ	2SA1385	AG
Q8	95KUAY0001AK	FN1A4M	AC
Q9, 12, 14, 16, 17	95KUAY0002AK	FA1A4M	AC
Q11	95KUAB0019BZ	2SB1094	AG
Q13	95KUAY0012AK	2SA812	AB
Q15	95KUAY0011AK	FN1F4M	AC

DIODES

Ref. No.	Part No.	Description	Code
⚠D1	95KUBB0148DZ	S1WB(A)60	AF
⚠D2	95KUBC0169CL	ERA22-06	AC
⚠D3, ⚠ 4	95KUBXAD120C	RD12SB	AC
⚠D5, ⚠ 7, 9	95KUBY0015AK	SC201-2	AD
⚠D6	95KUBA0004KZ	1SS53-T4	AB
D8	95KUBC0167ET	F5KQ90B	AH
	or		
	95KUBB0168FZ	F10P10Q	AK
D10	95KUBC0095BB	31DQ04FC	AE
D11	95KUBY0007AK	1SS220	AC
12			
13			
D15	95KUBDAK5R6B	RD5.6ESAB1	AB
D16	95KUBXAD2R0A	RD2.0SB-T1	AC
D17	95KUBXAD5R1B	RD5.1SB1	AC
D18	95KUDC0137ZZ	SEL4110R	AC
D19	95KUDC0138ZZ	SEL4810D	AC
⚠D20	95KUBXAD330A	RD33SB	AC

COILS AND TRANSFORMER

⚠L1	95KUKZ0306ZZ	Choke	AK
L2	95KUKZ0496ZK	4.7µH, Filter	AE
L3	95KUKY0001AK	100µH	AE
L4	95KUKZ0497ZZ	Choke	AH
⚠T1	95K129035044	PTTP51, Power Transformer	AV
X1	95KUZZ0128ZZ	Crystal	AF

CONTROLS

R21	95KUFBA472CY	4.7k(B)	AC
R28	95KUFBA331CY	330(B)	AC

CAPACITORS

⚠C1	95KUGFZ224FE	0.22µF, 250V, ±20%, Film	AF
⚠C2	95KUGZ0831ZZ	47µF, 400V, ±20%, Electrolytic	AK
⚠C3	95KUGFM103FB	0.01µF, 250V, ±10%,	AC
	or	Film	
	95KUGFQ103FB		AC
⚠C4	95KUGCU470BG	47pF, 1kV, ±10%, Ceramic	AB
⚠C5	95KUGAE101JG	100µF, 35V, ±20%, Film	AC
	or		
	95KUGAE101HN		AC
⚠C6	95KUGAE220FD	22µF, 35V, ±20%,	AB
	or	Electrolytic	
	95KUGAE220HN		AB
⚠C7	95KUGAF010FD	1µF, 50V, ±20%,	AB
	or	Electrolytic	
	95KUGAF010HN		AB
C8	95KUGCZ102BQ	1000pF, 500V, +100%~ −0%, Ceramic	AB
C9	95KUGAC122NS	1200µF, 16V, ±20%, Electrolytic	AE
C10	95KUGAC221FD	220µF, 16V, ±20%,	AC
	or	Electrolytic	
	95KUGAC221HN		AC
C11	95KUGZ0832ZZ	470µF, 25V, ±20%, Electrolytic	AD
C12, 14, 18, 19, 20, ⚠ 22, 29	95KUGXAFF104	0.1µF, 50V, +80%~ −20%, Ceramic	AB
C13	95KUGAB470FD	47µF, 10V, ±20%,	AB
	or	Electrolytic	
	95KUGAB470HN		AB
C15, ⚠ 21	95KUGXAEF103	0.01µF, 50V, ±10%, Ceramic	AB
C16	95KUGXAEF223	0.022µF, 50V, ±10%, Ceramic	AB
⚠C23	95KUGXAEF222	2200pF, 50V, ±10%, Ceramic	AA
⚠C24	95KUGXAEF331	330pF, 50V, ±10%, Ceramic	AA
⚠C25	95KUGXAFF473	0.047µF, 50V, +80%~ −20%, Ceramic	AB
⚠C26	95KUGCZ472CH	4700pF, 250V, ±20%, Ceramic	AD
⚠C27	95KUGCQ472AB	4700pF, 400V, ±20%, Ceramic	AD
⚠C28	95KUGCZ472CH	4700pF, 400V, ±20%, Ceramic	AD
C30	95KUGXAEF102	1000pF, 50V, ±10%, Ceramic	AA

RESISTORS

⚠R2	95KUEAE2R2AF	2.2 ohm, 2W, ±5%, Metal	AE
⚠R3	95KUEFD683BH	68k ohm, 1W, ±5%, Metal Film	AB
⚠R4	95KUEFCR33AW	0.33 ohm, 1/2W, ±10%, Metal Film	AA
⚠R5, ⚠ 6, ⚠ 7	95KUEXJAA104	100k ohm, 1/4W, ±5%, Carbon	AA
⚠R8	95KUEXJAA331	330 ohm, 1/4W, ±5%, Carbon	AA

Ref. No.	Part No.	Description	Code
⚠R9, 44, 49	95KUEXCAC104 or 95KUEXCAA104	100k ohm, 1/10W, ±5%, Carbon	AA AA
⚠R10, ⚠ 16, 25, 26, 32	95KUEXCAC223 or 95KUEXCAA223	22k ohm, 1/10W, ±5%, Carbon	AA AA
⚠R11	95KUEXCAC820	82 ohm, 1/10W, ±5%, Carbon	AA
⚠R12	95KUEXCAC101 or 95KUEXCAA101	100 ohm, 1/10W, ±5%, Carbon	AA AA
⚠R13	95KUEXCAC333 or 95KUEXCAA333	33k ohm, 1/10W, ±5%, Carbon	AA AA
⚠R14	95KUEXCAC682 or 95KUEXCAA682	6.8k ohm, 1/10W, ±5%, Carbon	AA AA
⚠R15	95KUEXCAC122	1.2k ohm, 1/10W, ±5%, Carbon	AA
R17	95KUEEB102BE or 95KUEEB102BF	1k ohm, 1/4W, ±5%, Carbon	AA AA
R18	95KUEFDR10BE	0.1 ohm, 1W, ±10%, Metal Film	AD
R19	95KUEXCAC152 or 95KUEXCAA152	1.5k ohm, 1/10W, ±5%, Carbon	AA AA
R20	95KUEXCAC822 or 95KUEXCAA822	8.2k ohm, 1/10W, ±5%, Carbon	AA AA
R22	95KUEXCAC563 or 95KUEXCAA563	56k ohm, 1/10W, ±5%, Carbon	AA AA
R23	95KUEXCAC392	3.9k ohm, 1/10W, ±5%, Carbon	AA
R24, 42, 43	95KUEXCAC473	47k ohm, 1/10W, ±5%, Carbon	AA
R27	95KUEEB821BE or 95KUEEB821BF	820 ohm, 1/4W, ±5%, Carbon	AA AA
R29, 52	95KUEXCAC105 or 95KUEXCAA105	1M ohm, 1/10W, ±5%, Carbon	AA AA
R30, 38, 53, 60, 64	95KUEXCAC102 or 95KUEXCAA102	1k ohm, 1/10W, ±5%, Carbon	AA AA
R31, 57, 58, 59, 63	95KUEXCAC103 or 95KUEXCAA103	10k ohm, 1/10W, ±5%, Carbon	AA AA

Ref. No.	Part No.	Description	Code
R39	95KUEEC271BE or 95KUEEC271AT	270 ohm, 1/2W, ±5%, Carbon	AA AA
R40, 41	95KUEEB390BE or 95KUEEB390BF	39 ohm, 1/4W, ±5%, Carbon	AA AA
R45, 46, 47	95KUEFE2R2BJ	2.2 ohm, 2W, ±5%, Metal Film	AC
R48	95KUEEB471BE or 95KUEEB471BF	470 ohm, 1/4W, ±5%, Carbon	AA AA
R50	95KUEXCAC153 or 95KUEXCAA153	15k ohm, 1/10W, ±5%, Carbon	AA AA
R51	95KUEXCAC471 or 95KUEXCAA471	470 ohm, 1/10W, ±5%, Carbon	AA AA
R54	95KUEXCAC683 or 95KUEXCAA683	68k ohm, 1/10W, ±5%, Carbon	AA AA
R55	95KUEXCAC822 or 95KUEXCAA822	8.2k ohm, 1/10W, ±5%, Carbon	AA AA
R56	95KUEXJAA102	1k ohm, 1/4W, ±5%, Carbon	AB
⚠R61, ⚠ 62	95KUEEC105BE or 95KUEEC105AT	1M ohm, 1/2W, ±5%, Carbon	AA AA
R65	95KUEEB682BE or 95KUEEB682BF	6.8k ohm, 1/4W, ±5%, Carbon	AA AA

MISCELLANEOUS

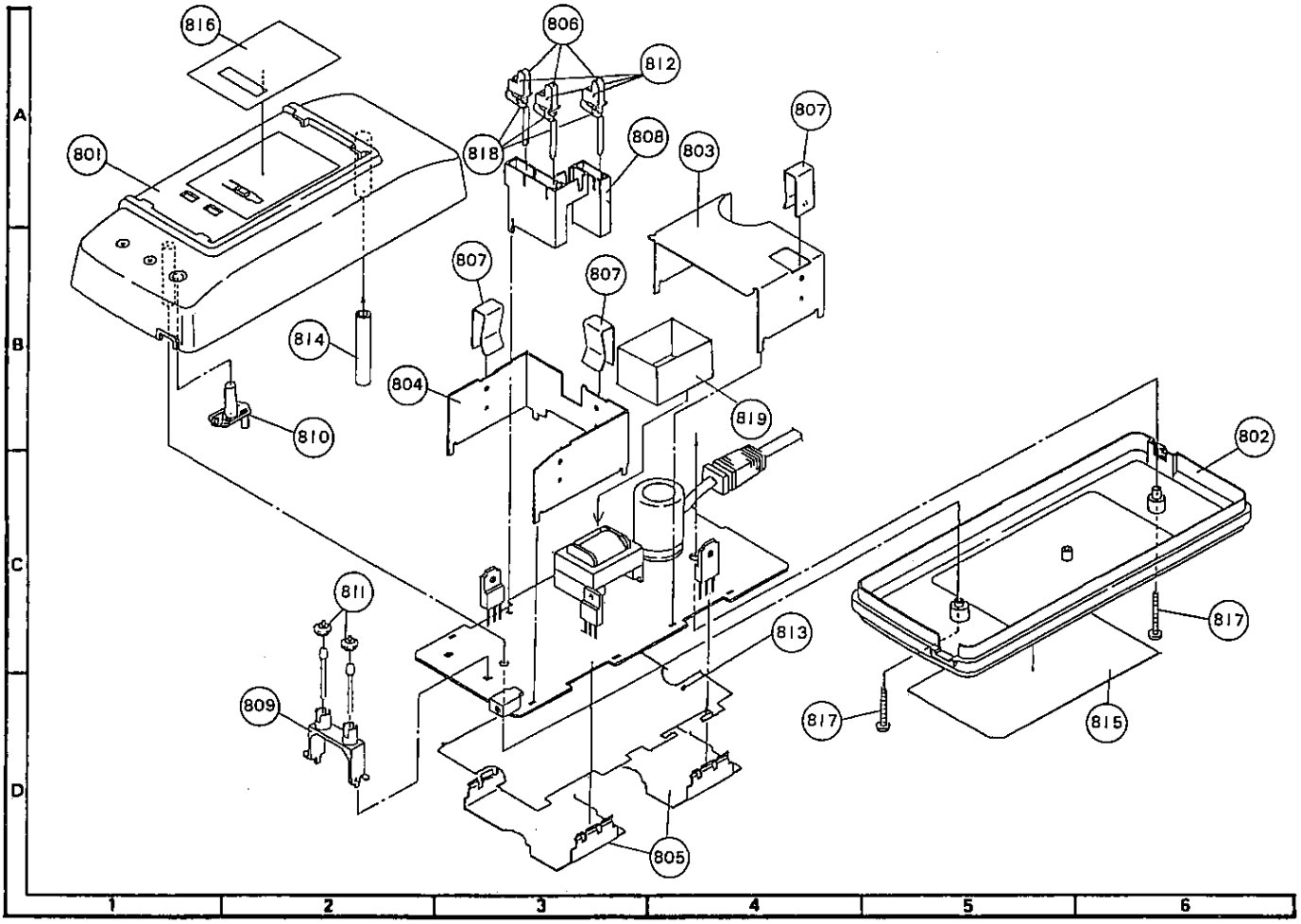
⚠F1★	95KPJCTG1601	Fuse, T1.6AH, 250V (VL-H400S/H)	AG
⚠F1★	95KPJCTB1601	Fuse, T1.6A, 250V (VL-H400X/H9E)	
⚠F2	95KPJT0085ZZ	Fuse, U25, 150°C, 2.5A, 250V	AE
⚠PC1	95KUDC0093BZ	Photo Coupler, PS2652-K	AF
⚠※	95KEHS0528ZZ	AC Cord (VL-H400S)	AN
⚠※	95KEHS0631ZZ	AC Cord (VL-H400H)	
⚠※	95KEHS0634ZZ	AC Cord (VL-H400X)	
⚠※	95KEHS0531ZZ	AC Cord (VL-H9E)	
CN1	95KPKZ0194ZZ	Connector, Post	AC
CN3	95KPGZ0024ZZ	Connector, Jack	AE
SW1	95KPFZ0219ZZ	Switch, Refresh	AC

Ref. No.	Part No.	Description	Code

※ **Remark:**
When changing main cord the whole cord with connection plug must be changed. (VL-H400S only)
The cable is kept as a spare part by:

- SWEEDEN
  SHARP ELECTRONICS (SVENSKA) AB
- DENMARK
  RUDOLPH SCHMIDT A/S
- FINLAND
  ASA KULUTUS ELEKTRONIIKA OY
- NORWAY
  TRANSEL A/S

Ref. No.	Part No.	Description	Code
CABINET PARTS			
801	95KMRZ5234ZZ	Cabinet, Upper	AM
802	95KMRZ5228ZZ	Cabinet, Lower	AL
803	95KLRZ5893ZP	Sink, Heat	AE
804	95KLRZ5894ZP	Sink, Heat	AE
805	95KLRZ5892ZZ	Plate, Shield	AD
806	95KFBZ0108ZZ	Terminal	AC
807	95KLRS5015ZZ	Supporter	AC
808	95KMRZ5225ZZ	Terminal Box	AE
809	95KMRZ5221ZZ	Holder, LED	AE
810	95KMRZ5224ZZ	Switch, Refresh	AD
811	95KMRZ5222ZZ	Lens, LED	AC
812	95KMRZ5231ZZ	Supporter	AC
813	95KGZZ5108ZZ	Sheet, Insulator	AC
814	95KMRZ5232ZZ	Boss	AC
815	95KSBB1578ZZ	Label Model (VL-H400S)	AD
815	95KSBB1579ZZ	Label Model (VL-H400H)	
815	95KSBB1603ZZ	Label Model (VL-H400X)	
815	95KSBB1580ZZ	Label Model (VL-H9E)	
816	95KSBB1577ZZ	Label	AD
817	95KRAZF002ZE	P Tight Screw, Pan Head (2.6×20)	AA
818	95KLRZ5912ZZ	Spring	
819	95KGZZ5112ZZ	Plate, Insulator	



VL-H400S/H/X
VL-H9E

SHARP

T9169-S
Printed in Japan